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INTERNATIONAL FIRE PROTECTION

THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Front cover picture courtesy of Spectrex Inc.

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It's imperative to the health of our planet that we reduce the impact that halon has on our atmosphere. Halon Banking Systems is dedicated to the environmentally responsible recycling and redeployment of halon for essential end-users. Let us help you dispose safely of your halon, and together, we can make the world a better place.

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Approved Flame Detectors – and then some!

SHARPEYE 40/40 SERIES FLAME DETECTORS offer unmatched performance and reliability – including patented, IR3 (Triple IR) Multi-Spectrum detectors that enable detection of small fires at distances up to 65m, with enhanced immunity to false alarms. These highly specified detectors operate reliably in the harsh conditions of offshore drilling and production platforms, FPSO vessels, fuel loading and storage facilities, LNG and LPG plants and petrochemical plants throughout the world.

The compact and lightweight design (only 2.5kg in stainless steel) offers low-power consumption with a heated lens for continued availability in difficult environments – as well as the reassurance of 3rd party FM3260/EN54-10/DNV performance approvals and IEC 61508 – SIL2 (TUV) certification to assure reliability. All detectors are, of course, Ex approved to ATEX/IECEx/FM/CSA/GOST R/GOST K standards for Zone 1/21 hazardous area locations. As a result, the warranty period has been extended to a full 5 years.

The Spectrex 40/40 Series detectors incorporate an integral automatic self-test that checks the device every 15 mins to ensure correct operation. The 40/40 Series offers many interface options for maximum compatibility with all control and fire detection systems – outputs include 0-20mA, dry relay contacts, RS-485 ModBus and HART.

The certified operating temperature range

has also been extended. The detectors will now operate reliably in temperatures from –55ºC to +75ºC (with an option for +85ºC) allowing their use anywhere in the world.

The SharpEye 40/40 Series includes the model 40/40I flame detector using the well-proven triple IR (IR3) technique, thus offering the highest immunity to false alarms combined with a massive 65m (215ft) detection distance for hydrocarbon fires with an enlarged cone of vision – 100º horizontal and 95º vertical.

Another major feature is the improved response to gas flames (methane, LNG, LPG etc) where small gas flames can be detected at distances of up to 30m (100ft). An important addition to the series is the model 40/40M Multi IR detector, which can simultaneously detect 'invisible' hydrogen flames at 30m (100ft) *and* hydrocarbon fires at 65m (215ft).

The 40/40 series comprises many detection techniques to suit every situation including triple IR (IR3), Multi IR, combined UV/IR, single IR or UV. Thus, Spectrex can offer unbiased advice on which detector is the correct solution to your detection needs.

The 40/40 Series detectors are programmable allowing the user alter factory default settings. Sensitivity levels, response time, alarm delay, heated lens operation etc are all able to be modified where required, either pre-delivery or post-installation.

Various accessories are available to tailor to your environment and a long range Flame Simulator to allow full 'end-to-end' proof testing in the Ex hazardous area at distances up to 9m thus avoiding the cost and inconvenience of scaffolding.

Detection of Gas Flames just got better!
Until recently, it was difficult to detect industrial gas flames/fires as the radiation output from gas flames is generally much lower than that from liquid hydrocarbon fuels; thus detection distances were limited. However, Spectrex has introduced additions and improvements to its wide range of optical flame detectors to significantly advance this capability.

The new Spectrex 40/40I Triple IR Flame Detector can now detect methane and propane (LNG/LPG) flames at up to 30 meters (instead of 18m before). This same detector will detect heptane /gasoline fuel fires at 65m.

The new 40/40M Multispectrum Flame Detector will do the same job as the 40/40I described above but can also detect "invisible" Hydrogen flames at 30 meters (previously limited to only 5-7m with other techniques). Applications include battery rooms, refinery H2 storage, generators, gas plant, fertiliser plants, and compressors

As the products of a hydrogen fire do not contain CO_2, normal IR3 detectors cannot be used and users had to accept the distance limitations of UV/IR type detectors. Now, with additional sensors, the 40/40M can detect both hydrocarbon and hydrogen fires over much greater areas and reduce the number of detectors needed.

In normal circumstances, people cannot see, taste or smell hydrogen gas, which is very flammable and easily ignited – can even self-ignite in some cases. You will not see a hydrogen fire – even up close. You may see a shimmer, like a mirage. Also, little heat is felt near the flame because very little heat (IR) radiation is emitted. As you see and feel nothing, you may even walk directly into the flame with no pre-warning.

For more information, email spectrex@spectrex-inc.com or visit the website at www.spectrex-inc.com

Intrinsically safe and explosion proof manual call point

E2S, the leading European manufacturer of warning devices for use in hazardous areas, has extended its capabilities with the development of intrinsically safe and explosion proof manual call points, certified to both ATEX and IECEx standards. The IS-CP4 intrinsically safe units are approved for use in Zones 0, 1 and 2 environments and the BExCP3 Ex e d explosion proof versions for Zones 1 and 2. Both types are available with either break glass or push button operation. The devices are manufactured from corrosion proof, copper free, marine grade LM6 alloy and are sealed to IP66, enabling them to be used in both offshore and onshore installations.

A comprehensive range of standard accessories and options can be specified; they can be fitted with a stainless steel lift flap and series and EOL resistors in a range of different values can be fitted as required. The units can be fitted with stainless tag and duty labels and, normally finished in red powder coat finish, special colours can be specified to enable

rapid visual identification of special functions.

The introduction of this new family complements the well-established BEx range of explosion proof sounders, beacons and loudspeakers and the IS-mini modular sounder and beacon family.

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Det-Tronics Fire and Gas Detection/ Releasing System obtains U.S. Coast Guard and Lloyd's Marine approvals

Det-Tronics system and detectors are hearty enough for offshore

DETECTOR ELECTRONICS CORPORATION (Det-Tronics) has announced that its Eagle Quantum Premier, (EQP) system has received Type-Approval from the United States Coast Guard (USCG) and from Lloyd's Register (http://eqp.det-tronics.com).

Det-Tronics has earned Type-Approval from the U.S. Coast Guard and Lloyd's Register.

Det-Tronics manufactures flame detectors, gas detectors, and safety systems and is part of UTC Fire & Security, a unit of United Technologies Corp. (NYSE:UTX).

Approval by the U.S. Coast Guard is required for flame and gas detection systems (including control panel, flame detectors, gas detectors, and accessories) in use where the USCG has jurisdiction – for example, in U.S. flagged vessels or vessels operating in U.S. waters.

The U.S. Coast Guard certificate was awarded after rigorous Factory Mutual Approvals (FM) witness testing proved the system and components meet the stringent USCG performance criteria. The products were verified to meet the U.S. Coast Guard's environmental requirements as described in 46 CFR 161.002.

Obtaining the meticulous Lloyd's Register of Shipping approval further verifies that the flame and gas detection system meets their specified performance requirements and is acceptable for operational use.

"We are pleased to obtain certification from these respected organizations," says Simon Pate, Director of Projects and Systems at Det-Tronics. "The hundreds of offshore sites and floating platforms that we currently serve worldwide can be assured of their wise choice for safety."

Detector Electronics Corporation (Det-Tronics) – a world leader in industrial fire detection, gas detection, and hazard mitigation systems – designs, builds, tests, and commissions safety systems ranging from conventional panels to fault-tolerant, addressable systems. Det-Tronics detectors are globally certified to current product approvals standards, including critical SIL2 industrial applications.

Further Information available at http://www.det-tronics.com

Waterproof ReSet Call Point (WRP)

STI (EUROPE) have extended their range of EN54 approved products with the announcement that the Waterproof ReSet Call Point (WRP) has successfully passed testing to the European Standard for fire alarm systems.

Already approved to the IP67 rating for dust and water ingress to ensure it is able to cope with the harshest of environments, the waterproof conventional fire outdoor model now joins the indoor version, already approved to EN54.

It is a highly reliable and robust manual call point that mimics the feel of breaking glass but features a glass-free operating element which can be easily reset. No broken glass means it is safer and more economical to use, with a warning flag dropping into view to confirm when it has been activated and a simple key-based resetting operation. Its IP67 rating means the WRP is ideal for a wide range of outdoor environments, from oil rigs to ships, while being glass-free means it is also particularly suited to wash down areas in food processing facilities, for example, where broken glass can be an issue. It can also be used in dusty environments such as factories and warehouses, offering a virtually maintenance free option with no potential for breaking, losing or incorrectly fitting glass elements during installation.

For applications subject to potential malicious or accidental activation of the fire alarm system, STI (Europe) also offers the Stopper II. This tough polycarbonate cover not only adds an extra level of protection to the WRP but is available with an integral sounder which emits a piercing 96dB alarm when the cover is lifted, providing both a visible and audible deterrent to malicious activation.

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Firetrace® counters the threat of vehicle fires

The increasing awareness of the threat of vehicle fires, and particularly buses and coaches, has come at a time when Firetrace International has announced a number of major orders from across the globe for its FIRETRACE® automatic fire detection and suppression system.

By Nick Grant

EMEA Vice President & General Manager, Firetrace International

Today the system is to be found protecting bus and coach engine compartments, running gear and wheel areas – the most common locations for the outbreak of a fire in almost 60 percent of the cases.

These systems are safeguarding operators from fires that could easily result in considerable financial loss, pose a serious threat to the lives of the vehicle occupants, and jeopardise the company's ability to continue to provide the level of service expected by fare-paying customers.

In addition to the vehicle's fuel and the risk of fuel line ruptures, any number of flammable liquids are present throughout any engine compartment. These include hydraulic, brake, automatic transmission and power steering fluids, plus combustible accumulated grease on the engine block, for which frayed or damaged electrical wiring can easily provide the ignition source.

While these risks can be lessened by regular maintenance and cleaning, engine fires will remain a constant threat, and the dynamics of the airflow in and around an engine compartment when a vehicle is in motion can seriously impair the performance and reliability of traditional techniques such as fusible link systems. This is because the heat and flame that typically rise from the source of a fire may be propelled away from the location of the fusible link by the motion of the vehicle, delaying its activation. The inevitable build-up of dirt in and around engines, vibration and intense temperature variations are also factors that are known to cause such systems to fail.

FIRETRACE uniquely deals with the problem of airflow, and reacts immediately when a fire breaks out and suppresses it before it has any opportunity to spread. It is also effective on every type of fire risk that is likely to be present – due to the use of ABC powder suppressant – is able to withstand harsh dust-laden environments, contend with extreme ambient temperatures, and stand up to intense vibration. In fact, genuine FIRETRACE from Firetrace International remains the only UL (Underwriters Laboratories) listed, FM (Factory Mutual) approved and CE (Conformité Européene or European Conformity) marked tube-operated system in the world that is tested as an automatic fire detection and suppression system. It also comes with approval for use on buses and coaches from the Danish Institute of Fire & Security Technology and the Swedish Fire Protection Association.

FIRETRACE is an automatic, self-seeking fire suppression system; one that requires no power source and comprises an extinguishing agent cylinder that is attached to polymer tubing via a custom-engineered valve. This proprietary Firetrace Detection Tubing is a linear pneumatic heat and flame detector that is immune to the vibration, shocks and temperature extremes found in engine and generator compartments. It was specially developed to deliver the desired temperature-sensitive detection and delivery characteristics in even the harshest of environments.

This leak-resistant tubing is routed throughout the engine compartment. Immediately a fire is detected, the tubing ruptures and automatically releases the

suppression agent, extinguishing the fire precisely where it starts and before it can take hold. The tubing is placed both above and behind the potential source of the fire to ensure that the airflow actually helps by directing the heat and flames towards the tubing, providing faster and more reliable detection and suppression in moving vehicles. Depending on the particular FIRETRACE system that is chosen, the suppression agent also flows through the delivery tubing to the front of the engine, again working with the airflow to flood the entire compartment.

The FIRETRACE Direct Release System utilises the Firetrace Detection Tubing as both the detection device and the suppressant delivery system. If a fire breaks out, the tube ruptures nearest the point where the most heat is detected, forming an effective spray nozzle that releases the entire contents of the cylinder to suppress the fire. The Indirect Release System uses the tube as a detection and system activation device, but not for the agent discharge. The rupturing of the tube results in a drop of pressure causing the indirect valve to activate. This diverts flow from the detection tube and the agent is discharged from the cylinder through diffuser nozzles, flooding the entire engine compartment.

All FIRETRACE systems are available with a manual release or an "alert" signal light and a horn that can be mounted on the operator's dashboard or control panel.

The FIRETRACE extinguishing agent cylinder is usually mounted in a convenient location in or near the engine compartment. However, choosing the correct agent is vitally important, as the possible presence of carbonaceous debris around the engine and the potential presence of flammable gases preclude the use of tube-based systems that rely solely on the use of CO_2, which is unsuitable for these particular fire risks. So, while FIRETRACE systems are available with clean agents such as DuPont™ FM200® and 3M™ Novec™ 1230, which have the essential firefighting characteristics that these hazards demand, ABC dry chemical suppressant is by far the most appropriate choice due to the openness and airflow typically found in these applications. IFP

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High performance fire resistant cables

By Dr Jeremy Hodge

Chief executive, BASEC

Fire engineers are making greater use of active fire protection systems in modern buildings.

At the same time, architects, engineers and designers are taking advantage of new technologies to produce innovative designs incorporating more elaborate layouts, and the need for more effective fire performance systems. As high prestige buildings become more complex in this way, the need for higher performance cables has been identified by a number of manufacturers. Public buildings such as hospitals, shopping centres, office buildings with atriums, sports stadiums and even some high specification residential premises are all using advanced fire safety engineering design approaches.

Traditional fire protection approaches rely primarily on materials choice and passive compartmentation to provide limitations to fire growth and spread. Fire safety engineering techniques allow a more open building structure, but they ensure safe evacuation in the event of a fire by a combination of traditional and modern, active fire systems such as smoke control and extraction, phased evacuation, gaseous fire extinguishing and firefighter support systems. Many of these systems require electrical power supplies and control circuitry to remain fully functional throughout a potentially serious fire lasting many hours. Examples include power supplies for fire-fighting lifts and smoke extract systems. Robust fire resistant cables are needed in order to satisfy these needs, cables that have been tested under quasi-real conditions and with proven performance.

Normal power distribution cables such as BS 5467 or BS 6724 have limited performance against sustained fire attack. Cables which need to remain operational throughout the fire need to be robust to not only fire, but also to impact damage from falling items of building structure and resistant to the effects of water spray from sprinklers or from fire fighting activities. Some well-established cable types, such as mineral insulated cables to BS EN 60702-1 remain very effective under such circumstances and are usually smaller in diameter than the equivalent armoured cable. A new cable fire test, BS 8491, has been developed to provide assessment of cables larger than 20mm diameter. The test incorporates direct fire attack, mechanical attack and water spray, over a variable time up to two hours. Several cable makers have produced enhanced fire resistant cables to meet this requirements, some incorporating spiral interlocked steel tape armour instead of the usual steel wire armour.

A new edition of BS 7846 for fire resistant armoured cables has just been published. As well as the traditional steel wire armoured fire resistant cables (category F2), the new type using interlocked steel tape armour has been introduced, classified as categories F30, F60 or F120, reflecting the length in minutes of the BS 8491 fire test. These cables can maintain full operational performance during such a fire by the use of a mineralised insulating tape over the conductors, normally made from mica. The armouring retains the structure of the cable and protects against shock. It is important to remember that cable cleats and other cable mounting techniques also need to survive the fire, shock and water attack.

Mineral insulated cables perform well against a combined fire, shock and water attack, and the BS 8491 test method should soon be extended to cover these generally smaller diameter cables.

Installers are beginning to see these new types of cable specified in high prestige buildings or where critical operations need to continue during a fire, for example emergency power supplies. Because the armour construction of the interlocked steel armour is different, new cutting and preparation methods will be needed. New gland types will be used, and traditional cone-type SWA glands may not be suitable. Installers will also need to make sure they are adequately trained to use such cables. IFP

Further information about **BASEC** is available at www.basec.org.uk or contact BASEC directly on 01908 267300

SEVO® Systems True Retrofit™ integrated into FireFlex® DUAL and 1230 Cabinets

SEVO® Systems True Retrofit™, utilizing 3M™ Novec ™ 1230 Fire Protection Fluid, is a major component in both of the newly released FireFlex® DUAL and 1230 integrated fire suppression cabinets. Unlike conventional fire suppression clean agent systems, SEVO takes full advantage of the characteristics of the fluid and increases the system pressure to the rated pressure of the standard welded cylinder – 500 psi, instead of the industry standard of 360 psi. Increased system pressure provides greater options in system design, allowing longer pipe lengths, smaller pipe diameters and more flexible design limits and nozzle placement. Retrofit of existing halon systems simpler and less costly with a 500 psi system, as existing pipe networks may often be used. One-to-one cylinder replacement reduces downtime and increases cost and space savings.

FireFlex Systems, Inc., of Broisbriand, QC, Canada incorporates the SEVO 1230 True Retrofit System as the clean agent suppression system of choice in the FireFlex 1230 and FireFlex DUAL Cabinets. These cabinets integrate all of the components necessary for a complete extinguishing system, including the releasing panel. The FireFlex DUAL also integrates a pre-action automatic sprinkler system with the SEVO 1230 System in a factory assembled single cabinet. All of the components necessary for both complete extinguishing systems are fully integrated, including a common releasing panel.

The FireFlex DUAL and 1230 cabinets are available in a variety of sizes and are designed to hold SEVO cylinders (ranging in capacity from 15L to 345L), allowing for specific configuration to the protected hazard. The cabinets are free-standing and made of robust schedule 14 steel with a rustproof, fire red paint finish, polyester powder-coated and oven-baked on to a phosphate base. They are equipped with one or two locked front doors, reducing space requirements for ease of installation and maintenance.

In the FireFlex DUAL, the combined pre-action system and SEVO 1230 suppression system are configured to prevent water discharge in the hazard. If the SEVO 1230 system suppresses the fire

before the room reaches a high enough temperature to open a sprinkler head, the sprinkler system will not be activated. The SEVO 1230 system can be actuated using a single or cross zone smoke detection system.

The pre-action system is available with a single interlock, electric release, in which the deluge valve will open and fill the system and wait for a sprinkler to activate before releasing water in the area. Also available is a double interlock, electric-pneumatic release, in which the deluge valve waits for a smoke detection and a sprinkler to activate before opening, fills the system and flows water through the activated sprinkler(s).

The SEVO True Retrofit System exclusively uses the halon alternative clean agent 3M Novec 1230 Fire Protection Fluid (FK-5-1-12). Novec 1230 Fluid has zero ozone depletion potential and the lowest atmospheric lifetime for chemical clean agent alternatives: 5 days. 3M's Blue Sky℠ Warranty offers 20-year protection against regulatory bans or restrictions on the use of Novec 1230 Fluid.

The FireFlex DUAL and 1230 cabinets offer the fire sprinkler contractor a cost effective and convenient method of installing clean agent systems. No longer will it be necessary to sub out this part of a contract. Only FireFlex Dual and 1230 cabinet systems meet the ever changing needs of the fire suppression industry by offering environmentally sustainable clean agent, flexibility and convenience. IFP

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FIA response to BBC Tower Block fire safety debate

The Fire Industry Association (FIA) has welcomed the extension of the debate regarding fire risk assessments and their role within high rise dwellings following the ‘Face the Facts’ programme broadcast by Radio 4 on 7 January.

The programme, part of an investigative consumer series by presenter John Waite, focused on the absence of fire risk assessments in tower blocks in the wake of the Lakanal House fire in London in which six people died in July 2009.

The FIA consider that, as a piece of investigative journalism, the BBC programme was reasonably well balanced. More specifically, the FIA applaud the measured position taken by the Chief Fire Officers Association (CFOA), as expressed by Iain Cox, particularly in respect of the risk posed by high rise flats, which Mr Cox very eloquently put into context – “The people at the very greatest risk are those in the flat or compartment of origin and . . . there must be an alarm system there to tell them they’ve got a fire and for them to get out. If the building’s built properly everybody else should be able to stay put. If the building isn’t built for that then you should have a different evacuation procedure. And it really is for the responsible person – the owner, occupier, manager or whatever – of those premises to consider that. High rise blocks are not implicitly dangerous in themselves but if you’re making assumptions about how they’re built which are wrong then that can be a danger.”

The membership of the FIA includes many organisations that are capable of assisting Responsible Persons to undertake fire risk assessments for their premises.

While the FIA agree that it is unacceptable for any Responsible Person (as defined by the Fire Safety Order in England and Wales) not to have carried out a suitable and sufficient fire risk assessment for any premises within the scope of the Order, it should be borne in mind that the duty to carry out fire risk assessments for the common parts of blocks of flats did not arise until 1 October 2006 (unless the premises constituted a workplace), and that no such duty exists in Scotland or Northern Ireland. Nevertheless, over the forty years or more in which high rise flats have existed throughout all parts of the UK, there is no significant history of multiple fatality fires involving occupants beyond the flat of fire origin; indeed, the attention focussed on the fire at Lakanal House has arisen from the very fact that the circumstances in which people tragically died were extremely unusual.

The FIA also acknowledge the amount of work involved in carrying out fire risk assessments in the case of any landlord with a large portfolio of properties. Indeed, it is noted that, when a fire, reputedly involving a £1,000,000 loss, occurred at the Fire Service College at Moreton-in-Marsh, an executive agency of the Department for Communities and Local Government, in May 2009, the College were, at the time, in the process of reviewing fire risk assessments across the College site. No fire risk assessment had been undertaken for the building in question under the Regulatory Reform (Fire Safety) Order; a previous fire risk assessment, undertaken in December 2004 under previous legislation, was still in place, notwithstanding CLG guidance to Responsible Persons that, following the introduction of the Fire Safety Order in 2006, the Responsible Person would need to revise a risk assessment carried out under previous legislation.

The membership of the FIA includes many organisations that are capable of assisting Responsible Persons to undertake fire risk assessments for their premises. Such organisations are signatories to the FIA Code of Practice for fire risk assessors, which requires that the work of carrying out fire risk assessments is only carried out by persons competent to do so. IFP

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Fire Industry Association

ASSERTA range from Fulleon

Using expertise gained from many years of fire sounder development, Fulleon's ASSERTA range incorporates innovative thinking, which has contributed to easier and safer installation procedures.

Careful electronic and acoustic design has provided class leading efficiency, while the integrated beacon has a carefully controlled asymmetric distribution that makes best use of the light output to give a much higher efficiency than omni-directional units.

The ASSERTA family of industrial alarms has been manufactured by Fulleon for more than seven years. Over that time the range has grown to encompass many more applications and customer requirements, resulting in three key variants: the ASSERTA MINI, ASSERTA MIDI and ASSERTA.

The baby of the family and the most recent introduction is the ASSERTA MINI. This compact 105dB(A) sounder with a robust enclosure is equally at home in fire, or in an industrial signalling system. Although the performance is similar to the RoLP MAXI, the enclosure provides higher IP66 protection and like the rest of the ASSERTA range there is the option of a bright, integrated xenon beacon. The MINI is unique in the ASSERTA family as it has the facility to add an anti-tamper module to the base, allowing it to be used with security systems in exposed locations.

- 105db(A) output suitable for localised applications
- IP66 protection suitable for most environmental conditions
- First and second fix installation for simplified installation
- 32 user selectable alarm tones avoids confusion with other signals
- 2 alarm stages to provide status signalling
- Fully integrated high efficiency beacon for optimised light dispersion (av version)

The ASSERTA MIDI is physically larger than the MINI and provides a higher sound output of 110dB(A). Again the protection is IP66 as is the option for a fully integrated beacon. The MIDI is ideal as a general purpose industrial and process alarm sounder, although it is frequently used with fire systems in noisy or harsh environments.

- IP66 protection
- Simple first & second fix installation
- 32 alarm tones
- 2 stage alarm

The top of the range is the ASSERTA, the largest and most powerful sounder with outputs of both

120dB(A) and 110dB(A) available. Additionally there are three alarm stages, together with voice capability and a timer to automatically silence the sounder after a preset time when used externally in residential locations. The ASSERTA warning sounder is designed to cope with harsh environments requiring protection to IP66. Design features are incorporated to ensure safer and easier installation, while providing flexibility with fewer product variants.

- 110db(A) or 120db(A) output versions available
- IP66 protection
- Simple first and second fix installation
- 42 alarm tones
- 3 stage alarm
- Sounder time out – user adjustable
- Optional swivel mount bracket
- Voice message option available
- Fully integrated asymmetric beacon uses light more efficiently (av version)

All three of the sounders share the same aesthetics, simplified installation and rugged IP66 enclosures. Both DC and AC supplies are catered for and although the majority are supplied with red enclosures, grey is also an option. The range is are available as sounder only or with an integrated efficient xenon beacon.

The ASSERTA Beacon is also available as a stand alone unit. The distinctive shape of this industrial beacon allows robust construction to be combined with highly efficient control of the light output to give a performance normally associated with much more powerful units. Versatility is ensured with a number of voltage and supply options. IFP

For more information please contact:
sales@fulleon.co.uk, or visit
www.cooperfulleon.com

STI Call Point (Re)Sets the Standard in Hong Kong

A somewhat unusual problem with condensation in a major Hong Kong commercial building has been resolved by the ReSet Call Point from STI (Europe) and a little lateral thinking from a resourceful fire safety engineering manager.

The China Resource Building, a 178 metre tall skyscraper in the Wan Chai district of Hong Kong island, was experiencing regular faults in its fire detection and alarm system. Peak Trade International Limited (PTI), a company that has been providing fire system design, engineering and maintenance in the Asian market for some six years, was called in to investigate. Kinman Chow, Engineering Manager with PTI, soon identified the problem. The breakglass call points in the public corridors on each of the building's 48 floors were semi-flush mounted. On completion of the day's activities, to conserve energy the air conditioning system is shutdown, with the resulting change in temperature generating condensation which was running down the wall and entering the call point. This was causing a fault report in the system, a problem which resolved itself during the day when the air conditioning was reactivated and the water that had collected in the callpoint's back box dried up. Mr Chow comments – "We conducted a full risk assessment for the China Resource Building. The faults were only occurring at night when the air conditioning system was shut off and the risk in terms of life safety was therefore low. However, we all know that fire safety is not just about protecting life but also the building itself, as well as its contents. From our risk assessment we recognised the need to do something to resolve this issue to ensure the building's owners had a fire protection system that was fully operational 24 hours a day."

Following the site survey, PTI recommended that the existing call points be replaced with STI's Reset Call Point and an Apollo mini module (located in the Air Handling Unit plant room) to interface with the Apollo analogue addressable fire detection system. The 'ReSet' mimics the feel of breaking glass but in a unit which offers the benefits and environmental advantages of a re-settable operating element. Although it is flush mounted, the call point's screw-type terminal is much less susceptible to water ingress than the plug and play design of the units that had caused problems. Even though a waterproof ReSet call point manufactured to IP67 ratings is available as part of the range, the manufacturing quality of the indoor version proved more than adequate to overcome the condensation problems encountered in this particular application.

The ReSet call point is manufactured to EN54-11 and approved by LPCB

This approach also resolved the situation with the call point located in the podium at upper ground floor level which could be affected by rain, particularly when the rain was coupled with high winds.

Since the introduction of the ReSet Call Point, the faults in the system have been completely eradicated. Mr Chow continues – "although the call point we used is recommended for use indoors, the build quality meant that it was able to resist the condensation in this application and the call points located in the public corridors have worked perfectly since being installed. Also, no false alarms or fault reports have been generated by the call point in the podium, despite sometimes typhoon conditions, which is a real testament to how robust the units are."

The success of the initial project and the positive response from the building's owners to the performance of the units has lead to a second phase where the remaining existing call points are being replaced with the STI ReSet. IFP

For further details please contact:
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INTERSCHUTZ

DER ROTE HAHN

INTERNATIONALE LEITMESSE FÜR RETTUNG, BRAND- / KATASTROPHENSCHUTZ UND SICHERHEIT

INTERNATIONAL EXHIBITION FOR RESCUE, FIRE PREVENTION, DISASTER RELIEF, SAFETY, SECURITY

LEIPZIG 7 – 12 JUNE 2010

Interschutz, the world's largest trade exhibition aimed at the fire industry will soon be upon us. Held once every 5 years, anyone and anybody involved in the fire safety and fire fighting industry will be in Leipzig, Germany between the 7th and 12th June 2010 attending this prestigious event. IFP takes a look at some essential information for visitors as well as exhibitors attending Interschutz.

VISITOR INFORMATION

INTERSCHUTZ 2010, 7 to 12 June

At a glance

Duration:
Monday, 7 June to Saturday, 12 June 2010

Opening hours:
Daily from 9.00 a.m. to 6.00 p.m.

Admission prices:

Advance sales and Ticket office

Single admission	18.00 EUR
Full-event ticket	41.00 EUR

Student's day ticket (incl. young people in military or civilian service: ID required)
11.00 EUR

Tickets can be bought in advance via the Internet (www.interschutz.de)

Free ride to and from event
Your admission ticket entitles you to ride public transit free of charge* on the day of the event on all lines operated by the MDV transit authority (Mitteldeutscher Verkehrsverbund), valid for the following regions and fare zones:

MDV fare zones
*The visitor's free ride to and from the exhibition center via MDV-operated public transit lines on the

day of the event is valid for the following regions and fare zones:

Leipzig
Leipzig County
Nordsachsen County
Mittelsachsen County
Burgen County
Halle
Saale County
Altenburger Land

Catalogue:
€17 plus postage and packaging (available approx. 3 weeks before opening day of event)
Internet: http://www.interschutz.de/catalogue

Visitor information:
Internet: http://www.interschutz/visitorservice
Email: interschutz@messe.de

Getting there:
If traveling by car, simply follow the signs to the exhibition center (*Messegelände*) in and around Leipzig; the Leipzig exhibition center is well sign-posted. Our dynamic parking guidance system will point you to the nearest parking space.

If traveling to Leipzig by train, you can reach the exhibition center (*Messegelände*) from Leipzig Central Railway Station (*Hauptbahnhof*) by taking the regional train, the FlughafenExpress train, the tram or a taxi. For more information, please inquire at the Service Point desk at Central Railway Station.

Numerous airlines serve the Leipzig/Halle Airport. There are over 300 direct flights to and from eight German cities and 72 cities abroad. Leipzig/Halle Airport also gives you easy access to the following major international airport hubs: Frankfurt, Munich, Paris and Vienna.

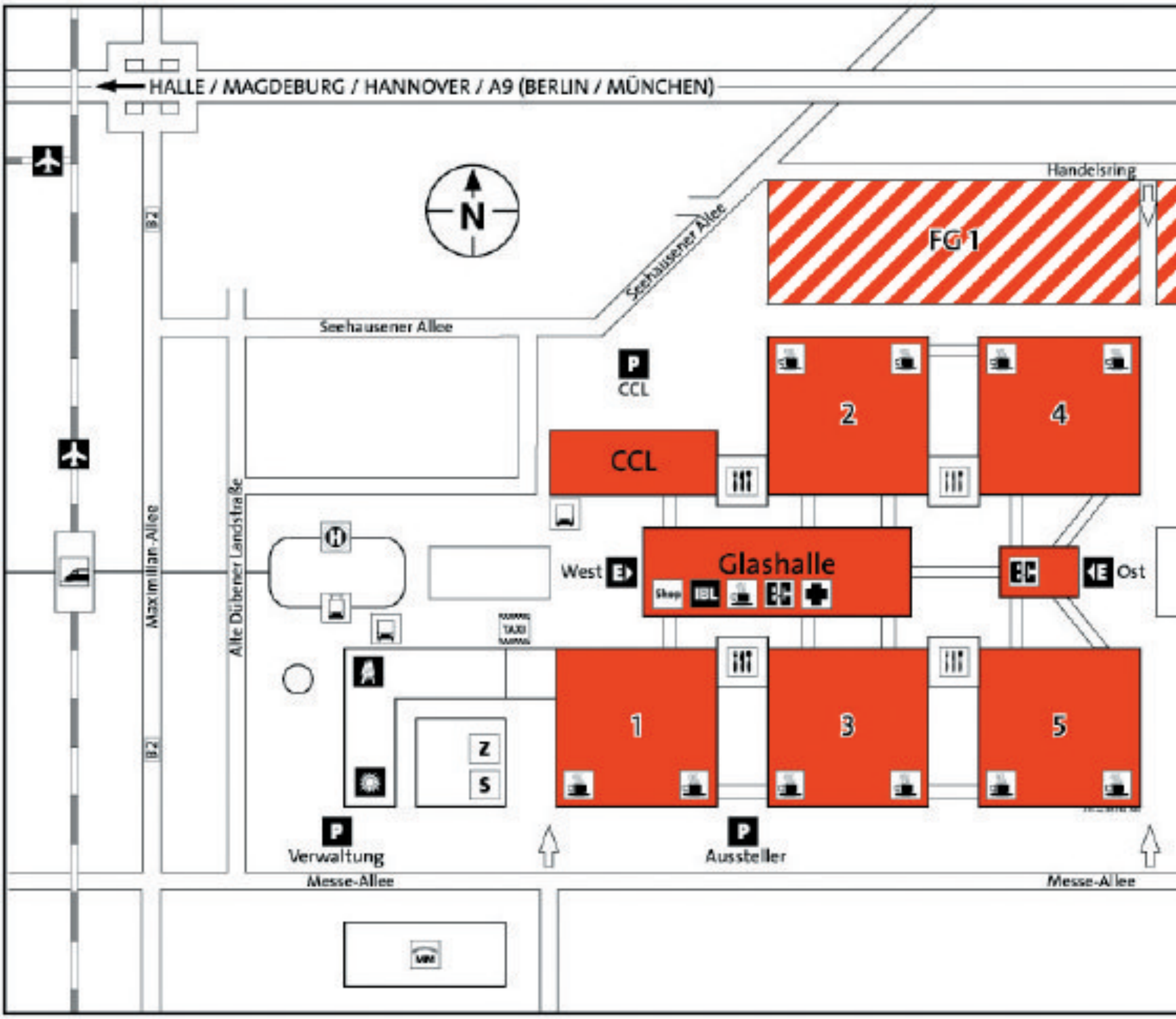
Travel and accommodations:
Do you prefer a quiet's night sleep, or would you rather be close to Leipzig's pulsating nightlife? The Leipziger Messe company can provide you with recommendations and reservations for any location or price category. Your selection of accommodations ranges from hotels, pensions and guesthouses with a total of 12,000 beds between them – from "shoestring budget" to luxury. For more information, visit www.interschutz.de/61050.

Parking:
The press parking lot for journalists at Leipziger Messe is located inside the exhibition grounds next to the Messehaus building. The parking lot is accessible via Messe-Allee, South 1 gate.

Range of exhibits:
Vehicles and vehicle equipment, fire extinguishing appliances and systems, fire extinguishing agents, technical support and environmental protection, rescue, emergency, first-aid and medical equipment, personal protective equipment, measuring and detection apparatus, control-station and signaling technology, information and organization, equipment for fire stations and workshops, building and construction industry, structural and organizational fire protection, associations, organizations, service companies, technical literature, model making, fan articles, gifts,

Exhibitors:
The organizers anticipate some 1,100 exhibiting enterprises, occupying more than 80,000 m^2 of net display space.

Press Center:
At the Messehaus building, open from Sunday, 5 June 2009, starting at 9:00 a.m.



Display Categories INTERSCHUTZ 2010

Vehicles and vehicle equipment
Hall 1, 2, 4 + Open-air ground 1

Fire extinguishers appliances and systems, extinguishing agents
Hall 1, 5

Technical support and environmental protection
Hall 1, 2 + Open-air ground 1

Rescue, emergency, first-aid and medical equipment
Hall 1, 2, 3 + Open-air ground 1

Personal protective equipment
Hall 1 and 3

Measuring and detection apparatus
Hall 3

Control station and signaling technology
Hall 3

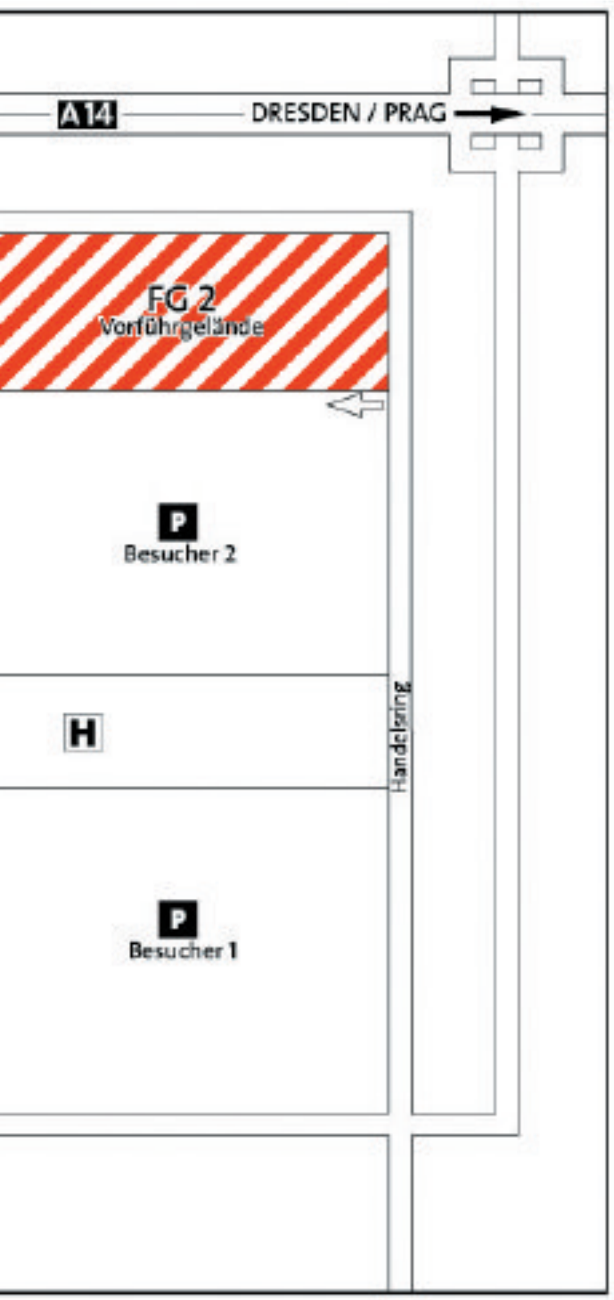
Information and organization technology
Hall 3

Equipment for fire stations and workshops
Hall 1, 5

Building and construction industry, structural and organisational fire protection
Hall 1, 5

Associations, organizations, services
Hall 1, 2, 3, 5

Trade literature, model making, gift items
Hall 1, 2, 4



Press Centre Entrance	Station Leipzig Messe
EC-Cash dispensing machine	Heliport
Business Lounge	First aid
Restaurant	Fair shop
Parking	Café
Airport-City-Shuffle	Police
Taxi	Customs
Tram line 16	Forwarding Agencies
Tram	MaxicoM
Bus Stop	(Euro-Asia Business Group)

The benefits of exhibiting at the show

The No.1 event in the industry calendar
With more than 120,000 visitors and over 1,200 exhibitors, INTERSCHUTZ is the leading international trade fair for public safety. Featuring the world's largest array of exhibits for disaster prevention, rescue and emergency services, INTERSCHUTZ offers you a fantastic opportunity to demonstrate the competence of your company and organization to the entire industry – with just one trade fair presentation.

Unique concept
Due to the combination of commercial and non-commercial exhibitors under the same roof you benefit as a supplier from directfeedback from the users of your security solutions. This puts you in an excellent position to fine-tune your product range to meet changing market needs.

Efficient business platform
With over 90% of visitors classed as trade visitors, you can be certain of reaching large numbers of decision-makers and buyers. This makes INTERSCHUTZ an ideal platform for successful new product launches and business deals.

International audience
At INTERSCHUTZ you'll meet top decision-makers from all over the world. This gives you ready access to profitable new markets.

Barometer of trends
Learn about pioneering innovations and key trends within the industry at the conferences, symposia and corporate lectures that accompany the show. You'll benefit from the professional expertise of leading experts and gather useful information for shaping the future course of your company and organization.

Attention guaranteed
An extensive advertising campaign and an attractive program of events serve to generate and maintain the interest of visitors and the media.

Excellent facilities
The modern exhibition complex in Leipzig with its fascinating steel and glass architecture provides you with everything you need in terms of both organization and technical facilities.

Reasonably priced entry
For as little as Euro 5,321 (plus VAT) you can book a 20 m^2 fair-package system stand, fully fitted and ready to go – and enjoy all the benefits of exhibiting at INTERSCHUTZ. IFP

Firetrace® provides protection for Midd

At last month's Intersec exhibition in Dubai, Firetrace International showcased a number of Middle East projects where its fire suppression technology is providing 24/7 protection for business-critical assets. Nick Grant explains.

By Nick Grant

EMEA Vice President and General Manager of Firetrace International

At the beginning of 2008 the Middle East construction sector was at an all time high. Over US$1 trillion of projects were under-way in the GCC [Gulf Cooperation Council] states and another US$150 billion's worth was in the pipeline. So, despite the recent debt crisis news from Dubai, the region remains one of the world's most prominent construction markets, where the investment in major projects and the development of the region's infrastructure is on a world-class scale.

One of the most prominent of these projects is the US$2 billion DOKAAEP [Development of King Abdul Aziz Endowment Project] in the holy city of Makkah in Saudi Arabia that today has a population in excess of 1.7 million. The architecturally distinctive complex, which comprises seven high-rise towers overlooking the Masjid al-Haram or Grand Mosque – the largest mosque in the world – will, when completed in 2011, accommodate 65,000 guests and visiting pilgrims. The 1,445,000 square metre project is believed to be the largest mixed-use complex of its kind in the world, and the central hotel tower will reach up to almost 600 meters, earning it a place among the tallest buildings in the world.

Among the many business and service-critical elements of the project are more than 300 escalators and elevators that will travel at speeds of up to six metres a second. Due to its incorporating a shopping mall, restaurants and food courts, as well as a large prayer area for 3,800 people, a 1,500 capacity convention centre and car parking for 780 vehicles, it also has extensive and sophisticated CCTV, heating, ventilation and air conditioning, data networking, access control, lighting, security and telecommunications installations.

With such complex building management systems, it was judged to be of major importance that the electrical control cabinets on which these systems depend be protected by dedicated and efficient fire detection and suppression. So much so that the electrical cabinets throughout the Dar Al-Handasah (Shari & Partners) designed building are being protected by hundreds of Firetrace International's genuine FIRETRACE® stand-alone, automatic fire suppression systems.

business-critical
le East projects

FIRETRACE was chosen because it satisfied the consultant's insistence on relying on a solution that is both UL [Underwriters Laboratories] listed and FM [Factory Mutual] approved. It also appealed because its proven reliability. ISO 9001:2008 registered Firetrace International's FIRETRACE is a "self-seeking" solution that is entirely self-contained, does not require an external power source, and so is ideal for protecting installations spread throughout the complex. Significantly, it can be activated only by heat or flame and so will discharge only when a genuine fire is detected, overcoming any potential for false alarm or unwarranted discharge.

However, for all of its sensitivity, FIRETRACE systems are unaffected by Saudi Arabia's high temperatures, which can average over 40°C between May and September.

Currently, 250 FIRETRACE systems have been installed, but Firetrace International's authorised trading partner in Saudi Arabia, Husam Sinjab Contracting Establishment, anticipates that this will ultimately increase to a figure closer to 400. For this particular project and application they utilise DuPont™ FM-200® clean suppression agent that is ideal for protecting electrical components. It leaves no residue to damage sensitive equipment, is non-conductive and non-corrosive. Also, unlike CO_2 [carbon dioxide], which some companies erroneously promote as suitable for direct discharge via tube-operated systems used to protect electrical cabinets, FM-200 does not cause thermal shock to the equipment being protected.

The FIRETRACE technology chosen for the DOKAAEP cabinets was the Firetrace Direct Release System. This comprises Firetrace International's proprietary Firetrace Detection Tubing that is linked, via a custom-engineered valve, to the FM-200 suppression agent cylinder. This specially-developed, leak resistant, small-bore polymer tubing is a linear pneumatic heat and flame detector that delivers the desired temperature-sensitive detection and delivery characteristics. Its flexibility is such that it can be threaded around each cabinet's tightly-packed compartments and components. When the tubing detects a fire anywhere along its length it ruptures, forming an effective spray nozzle that automatically releases the entire contents of the FM-200 cylinder, extinguishing the fire precisely where it starts and before it can do extensive damage to the cabinet or its contents.

Another Middle East project that relies on the Firetrace Direct Release System is for Qatar's Ministry of Drainage Affairs' Doha South STW [Sewage Treatment Works] project, where FIRETRACE is again playing a leading role in ensuring that critical electrical control panels are provided with dedicated, fast-action fire protection. The latest delivery of FIRETRACE equipment, which is being supplied by Doha Electrical and Mechanical Projects, Firetrace International's authorised Qatari distributor, brought the total number of systems supplied for the project to well over 400 in the past three years.

These systems are safeguarding a variety of machinery control cabinets, variable speed drives, and high and medium-voltage cabinets that control drinking water pumps, sewage and water treatment processes throughout the southern part of the city, which is home to 80 percent of Qatar's population. The project manages the flow of wastewater for approximately 500,000 people.

Each of the Ministry of Drainage Affairs' cabinets is protected by a single FIRETRACE cylinder to provide maximum protection. Every system is linked via a low-pressure switch to a Kentec Electronics fire panel – also supplied by Firetrace International – that is in turn connected to a main SCADA [Supervisory Control and Data Acquisition] system. Every Kentec panel has a unique address so, if a low-pressure switch is activated, the location of the fire is immediately evident. IFP

The company's **EMEA** head office is in the UK and can be contacted on +44 (0) 1293 780390

Firetrace International headquarters is in Scottsdale, Arizona, USA and can be reached on +1 480 607 1218 www.firetrace.com

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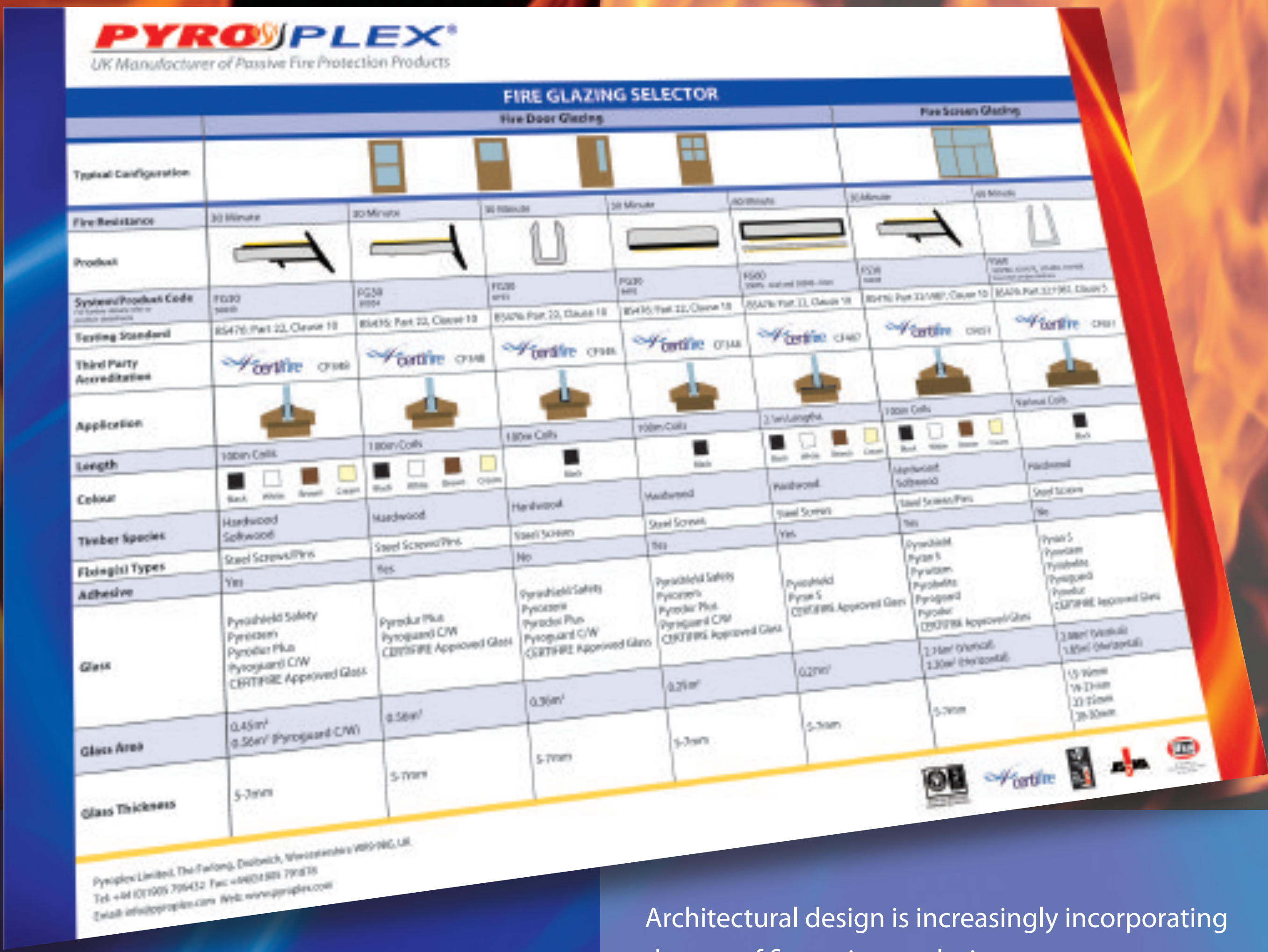

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Architectural design is increasingly incorporating the use of fire resistant glazing.

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BS EN ISO 9001: 2008
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The Derby Roundhouse , photo courtesy of Bowmer and Kirkland

By Steve Goodburn

CGI Sales Director

A Fire Safety Education

The continued evolution of fire resistant glazing has prompted one of the most current design styles – open plan. Be it a ten floor office block, a hospital waiting room or a school corridor – open plan living and working is the design style of the moment.

This design evolution has been enabled thanks to ongoing developments in the world of fire resistant glass – longer protection times and increased panel sizes now afford us the very best in fire safety without compromising design.

Fit for purpose

However this protection is dependent on compliance with a wide range of rigorous testing procedures, industry standards and building regulations. These are critical to both the specification and functionality of fire resistant glass.

Test certificates validate a product's suitability for use and define its limits. While there may be some variation in the testing practices from one country to the next, the certifications themselves all talk the same 'language' and give specifiers the necessary assurances that the product is fit for purpose.

CGI provides fire products to fulfil a wide variety of performances and appearances enabling specifiers to obtain all requirements for fire and speciality glasses from a single source. All products are tested to British and European standards as well as a variety of International standards for fire resistance and impact safety.

Options

Fire glass products can be grouped into three main categories. The first is integrity only (E) which prevents flames and hot gasses from spreading for the specified time – typically from between 30 and 60 minutes. The second option is integrity and radiation control glass (EW) which not only offers integrity but also offers some radiant heat control. This significantly reduces the amount of radiant heat transmitted through the glass. The third is integrity and insulating glass (EI) which has the

same ability as the above but also restricts the temperature transfer to the unexposed face.

Modern building design has created heightened demand for those products which offer integrity and full insulation (EI) or integrity and radiation control (EW). A fire glass with insulation or radiation control stops/limits the transfer of heat thereby mitigating the risks of spontaneous combustion, protecting adjacent parts of the building and buying more time for fire crews to respond and for people to evacuate safely.

The advice is that any building which has a high volume of people or business assets or a complex evacuation protocol should select from integrity and radiation control (EW) or integrity and insulation glass (EI). This is because most common materials will ignite spontaneously once temperatures reach 500-600°C, so even if the fire is contained in an adjoining room, catastrophic damage and further spread of fire can take place. A fire glass with insulation or radiation control also stops or limits the transfer of heat through the glass for a predetermined period of time and mitigates the risks.

Installation

There is a misconception that using fire resistant glass is 'job done'. However incorrect installation can render a tested specification useless and make fire resistant glass installations nothing more than normal glass.

It's of the utmost importance that all components in a fire-resistance glazing system are fire rated, compatible and approved if the glass is to fulfil its role and meet building regulations.

Standard glazing material products won't withstand the high temperatures experienced during a fire and will combust, melt or work loose within a very short period of time. Eventually the glass will twist or fall out, allowing the fire to spread. Specialist glazing materials should be specified along with the glass itself, as a fire resistant system. Ceramic tape is an ideal and economical medium for glazing most types of fire resistant glasses including both insulated and non-insulated panels.

Choosing the right frame is also very important. The combination of a fire glass with a poorly designed frame, or a frame manufactured from a

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EW = Radiation

Control of the transmission of radiated heat below a specified level

SGG VETROFLAM®, SGG CONTRAFLAM® Lite

EI = Insulation

Highest performance limitation of surface temperature on the unexposed side

SGG CONTRAFLAM®, SGG SWISSFLAM®

SAINT-GOBAIN GLASS

sub-standard material, will almost always render the system non fire-rated and at risk of immediate failure in a fire.

CGI has a wealth of evidence to cover hardwood timber frames as well as fire rated steel systems. There is a trend to move towards softwood frames because of cost and test evidence is available in this area too. CGI is also working to develop fire tested wooden framing systems of slimmer thicknesses to suit the demands of the architectural world. Steel and hardwood frames are the most suitable simple because of the non-combustibility of steel framing systems, or slow char rates of hard wood.

As well as the use of inappropriate frames, glazing media and sealant systems, there's also confusion about the approved sizes of fire resistant glass. The orientation and area of the glass is all important. A piece of glass that's been cut to portrait sizing should be installed that way. Install it horizontally and you may well be exceeding the test parameters of that product and thereby reducing its effectiveness. It will also no longer be a certified installation.

Continual change

The glass industry is continuously on a quest to develop the next generation of fire glasses. CGI invests heavily in research and development and more recently opened its own on-site facilities to continue developing technical capabilities.

Recent developments have included ceiling to floor panels in CGI's integrity and radiation control (EW) fire resisting glass Pyroguard and increased sheet sizes for Pyroguard insulation.

There's no disputing it, fire resistant glass is becoming a more and more common way of satisfying the fire safety requirements of a building, without compromising on the architectural and aesthetic qualities of the design. In less than 30 years fire resistant glass has been radically overhauled and as building design and construction trends evolve, so too will the fire resistant glass industry. IFP

CGI has a wealth of evidence to cover hardwood timber frames as well as fire rated steel systems. There is a trend to move towards softwood frames because of cost and test evidence is available in this area too. CGI is also working to develop fire tested wooden framing systems of slimmer thicknesses to suit the demands of the architectural world.

Fire rated glass manufacturer **CGI International** supplies the widest range of fire glasses for use in buildings around the world – which has tripled sales in the past decade.

Around 60 per cent of the company's glass is exported to countries such as Holland, Ireland, France, Spain, Sweden, Norway, Finland, Australia, China, Dubai, the USA and Turkey. CGI is currently expanding into new markets in Eastern Europe and the Middle East.

CGI's products include Pyroguard Clear, Pyroguard Wired, Pyroguard Insulation and Pyroguard Insulation Acoustic.

For more information on CGI please call 01942 710720 or visit www.cgii.co.uk

Spray Nozzles Selectio Systems: Options and

Figure 5

By Scott Martorano, CFPS

Senior Manager, Technical Service, The Viking Corporation

Water spray systems as defined in NFPA 15 can provide some of the most complex and challenging system designs encountered by fire protection professionals.

The selection of the proper spray nozzle that achieves the coverage area and water density required for the hazard being protected is one of the most important steps necessary to ensure the successful operation of the system. Of course, there are many other steps of equal importance and complexity that are taken during the design and layout process for water spray systems, but it is the selection of the proper spray nozzles that can present one of the largest challenges and may ultimately determine whether or not the water spray system will perform as required. Because of the wide variations in the characteristics of water spray nozzles including discharge patterns, velocities, distances of projection and the variables of the hazards being protected a careful evaluation of the nozzle selection should be completed by a professional with an in-depth knowledge of special hazards applications and water spray system design.

The complexity of nozzle selection can be increased in some cases where a limited amount of technical information is available describing the specific features or proper application for the spray nozzle being considered. In other cases, confusion may result from the terminology used in a manufactures technical data, such as high, medium and low velocity nozzles and the term velocity's relationship to the application. Given the substantial number of hazards where spray nozzles can be applied, and the various listings and approvals granted by Underwriters Laboratory, Factory Mutual and LPCB, the design engineer and layout technician are presented with a demanding selection process. This paper will attempt to clarify spray nozzle selection criteria for several of the most complex water spray applications and the terminology used to identify the unique characteristic of the spray nozzles.

Water spray and nozzles

The applications where spray nozzles are utilized can be severe. Primarily spray nozzles are used for exposure protection of bulk storage flammable and combustible liquid tanks to cool the shell, prevent explosion or collapse of the tank and extension of the fire. In addition, when designed properly and correctly installed water spray systems can be successfully utilized for extinguishment and control of some flammable liquids fires, some combustible liquid fires, Class A combustibles, and electrical transformer applications. Extinguishment of a fire using water spray is achieved "by cooling, smothering, emulsifying or diluting of flammable liquids or by a combination of these factors"[1]. "Controlling of a fire can be achieved with the

n for Water Spray applications explained

same mechanisms that achieve extinguishment, however due to different characteristics of the fuel, suppression is not possible"[2].

FM Global defines the mechanisms of fire extinguishment in the following manner:

Cooling action results to some extent from absorption of heat by water particles but mostly from the conversion of water to steam. When converted into steam, 1lb of water at 60ºF absorbs 1150 Btu. When the surface of the burning material is cooled to a point where flammable vapors are no longer evolved, the fire is extinguished.

Smothering action is obtained when the water spray is converted to steam by the heat of the fire, expanding its volume approximately 1,750 times. As the steam envelops the fire area, oxygen is excluded which helps to extinguish the fire.

Emulsification is obtained by mechanical agitation of water with oil or other non-water soluble liquids so that droplets of both materials become closely interspersed. Such an emulsion is produced by the action of water spray striking the surface of certain flammable liquids, rendering the liquid surface nonflammable. With liquids of low viscosity, emulsification is probably temporary, existing only during the application of the spray. With materials of higher viscosity, the emulsion will last longer and provide some protection against re-flashing.

Dilution of water-soluble liquids is usually a minor factor in extinguishing a fire because of the high degree of dilution required[3].

Spray nozzle selection and operation

The selection of spray nozzles involves consideration of several factors, primarily its ability to distribute water in a manner which allows the proper mechanism of extinguishment or control for the hazard to be achieved. Spray nozzles are available in a wide range of capacities and angles. The design elements used within the spray nozzle to manipulate the movement of water through the spray nozzle will impact the discharge velocity of the water droplets and the discharge patterns reach or range.

The velocity of the water droplets discharged from spray nozzles is not a factor for consideration of water spray system design within NFPA 15 or 13. However terms referencing velocity are used extensively within manufactures technical data and within the testing and installation standards of the Loss Prevention Certification Board (LPCB) which are used in many part of the world. The exact meaning of this terminology and how it applies to the spray nozzle application can be confusing and at times misleading, but it can be helpful to put a definition to the terms low, medium and high velocity if for no other reason than to help the designer and layout technician gain a better understanding of the nozzle application. The only written definitions for spray nozzles that can be found within the fire protection industry common referenced text are within the LPCB Standard 1277.

LPCB Standard 1277 defines medium velocity spray nozzles are "sprayers with deflection plates producing conical discharge patterns having bores not less that ¼ inch (6.3 mm) and meeting the test requirements of this standard apart from the fire test. These sprayers may be opened or sealed; the seal is identical to that of a sprinkler" and "sprayers with swirl chambers producing conical discharge patterns and having internal waterways not less than ⅛ inch (3.1 mm) and final exit bores not less than ¼ inch (6.3 mm) and meeting the requirements of this standard at a pressure of 20 psi (1.4 bar) apart from the fire test". High velocity spray nozzles are defined as "sprayers with swirl chambers producing conical discharge patterns and having internal waterways not less than ⅛ inch (3.1 mm) and final exit bores not less than ¼ inch (6.3 mm) and meeting the requirements of this standard apart from those for cone angles and distribution[4]".

From these definitions several of the key differences between medium and high velocity spray nozzles can be identified such as the incorporation of a deflector on some medium velocity nozzles and high velocity nozzle will have to meet different cone angle and distribution requirements. Also the term "swirl chamber" is introduced for some medium velocity and all high velocity nozzles. A "swirl chamber" is used within a nozzle to spin the water so it emerges as a solid cone jet.

Historically, the term velocity and distribution of the size of water droplets has been understood to describe the reach or area of coverage of the nozzles water spray pattern[5]. However, it is the velocity and dispersion of the water droplets themselves which will determine a spray nozzles ability to achieve the mechanisms of extinguishment or control of a fire.

Fixed nozzles have certain velocity or pressure ranges of effectiveness. Below the lower limit of the force range, the discharge pattern is ineffective; above the upper limit, velocities may be reached that will result in decreased effectiveness due to reduction in the discharge pattern, delivery distance and/or the water droplets[6]. At the point where a droplet of water is discharged from a nozzle, it is carried forward by its momentum, downward by the force of gravity and is retarded by friction in the air. The forward velocity of water droplets becomes very important in the reach of the nozzle[7]. Spray nozzles are designed to have various spray angles. The volume of water being discharged and the spray angle of the nozzle will determine the actual velocity of the water droplets and the range of the spray.

The size and velocity of the water particles will have an impact on the ability to extinguish or control a fire. If the droplets are too small, they cannot penetrate to the seat of the fire but are carried upward by the fire plume. If they are too large, their surface-to-mass ratio is small and they

cannot effectively cool the fire gases[8]. When being used to suppress flammable liquid fires with high flash points above 200ºF the water droplets must be traveling at a velocity sufficient to penetrate the surface of the flammable liquid.

Defining the ranges of water droplet velocities is difficult given the lack of published information available for spray nozzles. There are many factors which impact the actual velocity of water droplets including the water droplet size, orientation or angle of placement of the nozzle and the operating pressure. The large range of spray nozzles available on the market makes it almost impossible to clearly define the three velocity categories. However, for the purpose understanding the potential application of each type of nozzle, in addition to the information provided above one potential method of defining the velocity terms is as follows.

Low velocity spray nozzles are similar in discharge characteristics to standard spray sprinklers. The water droplet size is within the same range. A review of two studies from the U.S. Department of Commerce, National Institute of Standard and Technology (NIST) called "Determination of Water Spray Drop Size and Speed from a Standard Orifice, Pendent Spray Sprinkler[9]" and "Understanding Sprinkler Sprays: Trajectory Analysis[10]" Place the measured water droplet velocities for K 5.5 spray sprinklers between 2 ft/sec and 27 ft/sec flowing 15 gpm at 7 psi. It would be expected that a spray nozzle with similar characteristic may have water droplet velocities in the same range.

High and medium velocity spray nozzles cover a much broader range of application. Due a wide range of K factors and operating pressures the water droplet size can range from the larger droplets found in the discharge of a standard sprinkler to the much smaller water droplets that would be similar to the sizes found in water mist systems. At least one manufacture publishes water droplet velocity information for a medium velocity nozzle. When the water pressure range is between 20 psi (1.4 bar) and 50 psi (3.5 bar) the water droplet velocity was 49 ft/sec (15 m/sec) to 82 ft/sec (25 m/sec). High and medium velocity spray nozzles are used primarily within this pressure range so it can be anticipated that the water droplet velocity may be similar to this published information for many spray nozzles.

Water, spray nozzles and flammable or combustible liquids

NFPA 30 the Flammable and Combustible Liquids Code provides the definitions for flammable and combustible liquids. Flammable liquids are defined as any liquid that has a closed-cup flash point at or below 100ºF. Combustible liquids are defined as any liquid that has a closed-cup flash point at or above 100ºF[11]. Water can effectively utilize several of the control and extinguishment mechanisms on a flammable or combustible liquids fire.

Figure 1

Extinguishing a flammable liquid fires can occur if the flammable liquid is miscible with water, large quantities of water can dilute and the liquid to the point where it is no longer flammable and cool the liquid below its flash point; however extreme care must be taken when using this approach to ensure the container which is holding the combustible liquid does not overflow and inadvertently spread the fire. One technique that can be used to prevent this situation is to select a nozzle which discharges a fine spray with droplets less that. 4 mm. The fine spray will dilute and cool the surface layer of the flammable liquid limiting the amount of water introduced to the container and reducing the possibility of an overflow. Fires involving flammable liquids that are not completely miscible with water such as ether and ketones can be controlled utilizing water spray[12]. Low to medium velocity solid cone nozzles are well suited for this type of application (figure 1).

Figure 2

Fires involving combustible liquids with flash points above 200ºF that are not miscible with water such a lubricating oil, can be suppressed using high velocity solid cone nozzles (figure 2). When the water is discharged with a velocity that is sufficient to penetrate the surface of the combustible liquid, suppression is achieved by cooling the surface below the liquids flash point.

Extinguishing or controlling a flammable of combustible liquids fire with water is complex. It involves many considerations beyond the spray nozzle selection. The successful application of water to a flammable liquids spill will probably cause the burning flammable liquid to spread, unless a dike is present. Another problem is encountered if the liquid has a high flash point and is less dense than the water. In this case, water droplets, even if applied gently, will sink below the surface and turn into steam, causing eruption of the flammable liquid into the flames and increasing the burn rate[13]. In addition, when combustible liquids burn in depth for long periods of time the liquid can take on the characteristics of a flammable liquid. Careful consideration should be given to the application, the volume of water that will be introduced and it potential impact on the situation.

Water and electrical equipment

Water spray systems are often used to provide fire protection and complete water impingement for oil-filled electrical transformers (figure 3). Transformers are available in many different sizes and configurations and a complete understanding of all the relevant transformer information is necessary to ensure the proper nozzle selection. However, high velocity spray nozzles can be extremely effective in extinguishing the high flash point non-miscible combustible liquids fire that results from the catastrophic failure and explosion of the electrical transformer. Additional considerations in the selection of the proper nozzle outdoor transformers include the effect of wind, the nozzle capacity and placement of the nozzle. Electrical clearances may require the selection of a nozzle capable of a large water discharge to achieve the proper range and coverage of the water spray.

The water spray system is also designed to provide cooling for the structural and metal elements while the combustible liquids are is

Figure 3

being extinguished. NFPA 15 outlines the specific requirements for placement of the spray nozzles to avoid the live un-insulated electrical equipment and it is critical that the water spray system be designed in a manner to remove power before water is applied.

Exposure protection of bulk storage flammable and combustible liquid tanks

Water spray systems designed for exposure protection as defined in NFPA 15 provide "absorption of heat through application of water spray to structures or equipment exposed to a fire, to limit surface temperature to a level that will minimize damage and prevent failure". The nozzle selection for this application will be based on the nozzle discharge capacity, spray angles and patterns such as the shaped spray pattern nozzle in figure 4. The objective of the water spray is to keep the tank cool. This prevents the liquid from boiling away. If the liquids within the tank boil away, the heat will not be transferred away from the shell. This could cause the shell to rupture in the case of direct flame impingement.

Figure 4

It is important that the nozzle discharges overlap to prevent dry spots on the surface of the tank and that overspray of the storage container be limited to achieve the most efficient hydraulic design. Consideration must also be given to the effects of wind and possible updrafts from a fire in close proximity to the tank and evaporation of smaller water droplets from heat. Typically the nozzles are placed and will discharge the water spray at the top of the equipment to allow the water to run down the surface. The actual amount of water run down is difficult to predict because of the effects of wind and the shape of the tank (figure 5 page 30).

Conclusion

The selection of spray nozzles can be a complex and challenging process. The variables that affect the selection can be numerous. It is important for the fire protection professional to keep the goal or purpose of the water spray system in mind during the selection process. The characteristics of the spray nozzle will determine its effectiveness in extinguishing a fire, controlling a fire or cooling a surface. For example, when extinguishment or control of a flammable or combustible liquids fire is the purpose of the water spray system then a nozzle should be selected that can accomplish the appropriate mechanism of extinguishment for the flammable or combustible liquid being protected. When the purpose of the water spray system is to cool a bulk storage fuel tank the nozzle selected should have the discharge capacity and spray angle required to the appropriate water density over the surface are of the tank.

Although the terminology can seem confusing, it can actually assist the design engineer and layout technician in quickly identifying the most appropriate group of nozzles for an application. NFPA 15 and 13 are the basis for these designs, however as you can see because of the complex nature of the hazards involved a considerable amount of additional research may be necessary to develop an effective fire protection design. In these cases it is always prudent to consult the spray nozzle manufacturer for specific technical information of the performance expectation of the spray nozzle being considered. IFP

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Chicago Fire Department responds to unseen threats with best practices that leverage available technology

Unseen threats are the routine for first responders. Knowing if there is imminent danger is key to getting home safely. This article outlines several cases where the Chicago Fire Department learned the value of using available technology in gauging an appropriate response.

By Bob Durstenfeld

RAE Systems' Senior Director of Corporate Marketing.

More than 10 years ago, the Chicago Fire Department began deploying single-gas CO (carbon monoxide) monitors on all 200 of its engines and trucks. This came about with the advent of commercially available CO monitors for home use. The early home units often went into false alarm, and this would result in a panicked call from a homeowner for a response from the fire department. The need to know if there was an immediate threat to life or health could not wait for the arrival of the hazardous material response team. Each engine company was initially equipped with an industrial, single-gas CO monitor. These were most useful in the winter, when CO calls were often due to incomplete combustion in faulty heating systems. "After a family died from carbon monoxide poisoning 12 years ago, we first deployed single-gas CO sensors on every truck," said Chief Daniel O'Connell, coordinator for Chicago Fire Department (CFD) Special Operations and Hazardous Materials.

Single-gas CO monitors might still be the norm, had it not been for some catastrophic events. In one instance, an engine company arrived for what

4-Gas field calibration team with Chief Anthony

they thought was a CO call, and because there was no alarm from the CO monitor, they assumed all was safe and entered the building. One of the firefighters turned on the building's lights, initiating what turned out to be an explosion from a natural gas leak. "We began investigating the use of 4-gas meters two years ago, after several 911 calls where the CO monitor was not sufficient to detect the unseen threat, and we had two gas explosions," added O'Connell.

Over this two-year period, the department ran various evaluations on different combinations of instruments and sensors. The objective was to determine if there was an immediate threat to life or health, and if the instrument alarmed, whether it would be sufficient to determine the need to secure the area and notify the HazMat team. The department's two HazMat teams ran experiments using various combinations of instruments using the following four sensors: lower explosive limit (LEL) for combustible materials, carbon monoxide (CO), hydrogen sulfide (H_2S) and oxygen (O_2). Each of the sensors was chosen for the life-critical or time-critical threat information provided if it went into alarm. The carbon monoxide sensor was already proven. The lower explosive limit sensor was selected to detect the presence of high levels of flammable gas. The hydrogen sulfide sensor was chosen because H_2S is a common threat that easily saturates a responder's sense of smell. The oxygen sensor was selected because it would immediately indicate the need for an air mask and might also show the presence of an oxidizer. Other sensors that were considered included chlorine and ammonia, but both substances have other characteristics that make them identifiable. Four-gas instruments from many manufacturers were evaluated for ruggedness, user interface, calibration stability, battery life and ease of service. "We went through an evaluation process and selected the RAE Systems QRAE. The QRAE adds to the complement of RAE Systems instruments already utilized by the CFD HazMat teams, including wireless **AreaRAE** RDK monitors, **MultiRAE Plus 4-gas monitors with PIDs**, **ppbRAE** PIDs for decontamination and others," said O'Connell.

QRAE Calibration Desk at Chicago Fire Department Air Mask Services

"Part of our decision to go with the RAE Systems QRAE was the reliability and durability of the instruments," said Robert Anthony, coordinator for the Chicago Fire Department's Division of Equipment and Supply. To gain personnel efficiency, the 4-gas instrument calibration team works out of the same division as the breathing-air pack services. "Our in-house technicians maintain our fleet of over 200 QRAE units deployed at 102 firehouses. We currently calibrate each unit using the AutoRAE calibration station on a monthly cycle."

The fire department training academy was called to develop a training and certification program in the new 4-gas instruments. "Much of the initial training on 4-gas instrument deployment was done by AFC International, an equipment supplier to the Chicago Fire Department," said Doug Mayer, RAE Systems Director of Eastern U.S. and Canadian Sales. "Jim Seneczko and his company have provided much of the on-site training and support that the Chicago Fire Department required." This training was encouraged using rank incentives in a similar fashion to emergency medical certifications. "The Chicago Fire Department has encouraged all of our firefighters to learn the basics of hazardous material response by offering level A and B Technician certifications," said Lieutenant Myron Kovalevich from the Chicago Fire Department's Training Academy.

At the same time as the fire department was growing in its use of gas monitors on every truck, the HazMat team was able to become more specialized. The team began to develop new response protocols which in turn were made part of the academy's training. Two of the procedures that have become standard practice are the immediate use of an air-mask or SCBA at 35 ppm (parts per million) of carbon monoxide, and a CO reading of

AreaRAE Rapid Deployment Kit, wireless gas monitors at the ready

over 100 ppm makes the response a level-one HazMat event. Other meter based procedures include the immediate ventilation of a response scene when a Lower-Explosive-Limit exceeds ten percent and the use of the 4-gas meter in post fire overhauls to determine when it is safe to remove the SCBA. On-site response procedures include a fresh-air calibration of the meter prior to any building entry in addition to the monthly full instrument calibration. For confined space entry, the fire department has deployed both the 4-gas meter and in many cases the wireless AreaRAE monitors. As part of each after-response review, the on-scene data logs from any gas meters that were deployed are reviewed for alarms and reading response times.

The September 11, 2001, attacks in New York and Washington, D.C., began a new era for first responders, both in terms of homeland security responsibilities and the possible threats that might be encountered. The first protocols and equipment were tested as part of the May 2003 TopOff Drills, multi-agency events that included the United States National Guard Civil Support Teams, the United States and Illinois Environmental Protection Agencies, the US Centers for Disease Control, the Federal Bureau of Investigation and the United States Coast Guard. As a result, the HazMat teams began to develop decontamination protocols for both toxic chemicals and radiation. The drills included the first deployment of AreaRAE wireless toxic gas and radiation monitors for public venue protection. The TopOff Drills showed the need for critical incident information to be available beyond the local incident commander. The advent of secure internet protocols has enabled the fire department to engage remote specialists from the federal agencies and allowed all of them to see the same real-time sensor data. During large events, such as the annual "Taste of Chicago" that runs for 10 days and includes both an air and water show, connected gas detection technology has played a key role in creating safety deployment comfort with both civilian and municipal data users.

New technologies have allowed the Chicago Fire Department HazMat Teams to develop public venue protection protocols that have moved beyond the normal responsibilities of the fire department. The City of Chicago responded potential large scale threats that might require a multi-agency response by forming the Office of Emergency Management. This multi-agency city directorate has responsibility for issues related to Homeland Security. The department also took on the responsibilities performed by the Fire Department's Bureau of Emergency Preparedness and Disaster Services and created what is now known as the Office of Emergency Management and Communications (OEMC). Today, OEMC protects life and property by operating the public safety communications system and by coordinating and managing emergency situations, and now includes 911 emergency services, 311 city services, the Office of Emergency Management, and City Operations.

On February 10, 2005, the OEMC launched a new Homeland Security Grid that includes both fiber optic and copper cable. This grid enables Chicago to expand its use of surveillance cameras and biological, chemical, and radiological sensors. These cameras and sensors simultaneously feed into the City's Operations Center for coordination of both critical city services and emergency response. The grid gives city officials tools to better respond to developments in homeland security, law enforcement, traffic management, crowd control, and severe weather. IFP

Bob Durstenfeld has spent the last seven years as RAE Systems' Director of Corporate Marketing and Investor Relations. Before joining RAE Systems, Durstenfeld served as Senior Director and Staff Technologist for the Silicon Valley office of Fleishman-Hillard Public Relations. Bob has also held marketing and management positions at Agilent Technologies and Hewlett-Packard Company. He has published articles on Port Security, Wireless Gas Detection, Semiconductor Testing and Automation Technology.

MR. Durstenfeld received his Masters in Engineering Management and International Marketing from Santa Clara University and his BS in Engineering and Biology from UCLA.

Protecting hazardous product storage tanks and LPG/LNG gas terminals

The major concerns associated with the storage and handling of hazardous materials, e.g. LNG/LPG, are the fugitive emissions and liquid spills that evaporate when exposed to atmospheric pressure.

By Ian Buchanan

European Manager, Spectrex Inc

The light gases migrate very fast over large areas, hence the need for reliable, fast, gas and flame monitoring over large areas of pipelines and storage facilities. The heavier-than-air gases/vapours tend to accumulate in low areas, thus posing a fire/explosion hazard in the congested production, pipelines, manifolds and bund areas.

Petrochemical storage tank farms require monitoring of heavy combustible hydrocarbon gas leaks that stay close to the ground from leaks in storage tanks, pipes and valves. There is a significant fire risk due to ignition of these leaks.

LNG facilities

Liquefied Natural Gas (LNG), with its major component methane, is drilled from the ocean bed in various parts of the world, using either fixed exploration platforms or FPSO vessels. The natural gas is transported via pipelines and tankers to the onshore facilities where it is stored in special tank farms before it is vaporized and distributed to the various users.

At the terminal, the natural gas is stored in liquid form at –320°F (–160°C). Such terminals are situated in strategic locations close to areas of high demand or at the extremities of the gas supply network where the natural gas can be rapidly revaporized and delivered into the national transmission system.

An LNG terminal comprises unloading dock area, storage tanks, vaporizers, liquefiers, control rooms, maintenance areas and offices. Gas & Flame Detection are required in the unloading, storage, liquefier and vaporizer areas.

LPG storage

Beside this natural resource, the petrochemical industry has developed various distillation and cracking processes that produce light hydrocarbon gases like methane, ethane, propane, butane and their derivates ethylene, propylene, butylene, etc.

Figure 1

These refined gases are compressed and liquefied for storage purposes and known commercially as Liquefied Petroleum Gases (LPG).

The unique properties of LPG allow for it to be stored or transported in a liquid form and used in a vapour form. In industrial applications, LPG is typically stored in large vessels that are spheroid shaped. These are the large "golf ball" shaped and oval vessels commonly seen at refineries.

LPG vapours are heavier than air and tend to collect on the ground and in low spots. After LPG is released, it readily mixes with air and could form a flammable mixture.

In the past, adequate detection coverage often required a great number of combined UV/IR type detectors. This solution, however, was costly and detectors were subject to false alarms.

In developing fire protection methods for liquefied gas storage facilities, the chief concern is a massive failure of a vessel containing a full load. The probability of this type of failure occurring can be avoided or at least controlled to a reasonable and tolerable level with appropriately designed and operated facilities.

Most fires originate as smaller fires that become increasingly more dangerous. Of greater importance, and more likely, is a leak from a pipe, valve or other component leading to ignition, flash fire, pool fire and eventually to a pressure fire at the source.

Loading stations

Petrochemicals, whether used as refined fuels, raw materials or feedstock for other industries, have to be shipped from a processing plant or storage farm. They have to be offloaded at loading stations in either gas, liquid or compressed form – all of which are highly combustible and a major hazard to any equipment or people working in or living close to these areas.

Railway loading platforms and truck filling stations require flammable gas and flame monitoring capable of detecting fugitive emissions and alerting in case of explosive concentrations or the incidence of fires.

Fire protection design considerations

In order to reduce the fire risk at such facilities, adherence to national regulations, various design considerations and requirements, such as layout, spacing, distance requirements for vessels/storage tanks, drainage and containment control, will help to limit the extent of fire damage.

Equally important are properly designed, installed and maintained fire protection systems, which attempt to minimize or limit the fire damage once a fire occurs.

Gas/Vapour and Flame Detectors mounted in the vicinity of a tank complete the automatic activation of these systems. Vapour detection provides early detection and warning, but activation of water application systems must be confirmed through quick response flame detection.

An evaluation of the facility is necessary in order to determine the correct types and locations for gas and flame detectors.

The objectives of the fire protection system are to:

- Detect a fire or vapour leak at an early stage
- Control a fire or leak in the shortest possible time
- Minimize damage
- Minimize disruption to operations
- Minimize the incidence of false alarms.

Flame detection

Optical flame detectors provide the fastest detection of a fuel fire in the early ignition stage. Their fast response capability, adjustable field of view and programmability make them extremely well suited for this duty. Flame detection with high sensitivity and immunity to false alarms is an essential determining factor when designing systems for this application.

In the past, adequate detection coverage often required a great number of combined UV/IR type detectors. This solution, however, was costly and detectors were subject to false alarms.

The Triple IR (IR3) detector solution, like the Spectrex 40/40I shown in fig 1, detects fires at up to 215 ft (65m) dependent on the fuel, offering three to four times the detection coverage of any solution using conventional IR or combined UV/IR detectors – and, as a result, IR3 flame detectors are now widely recommended. The IR3 flame detector provides better and faster response to the fire scenarios, providing larger area coverage with

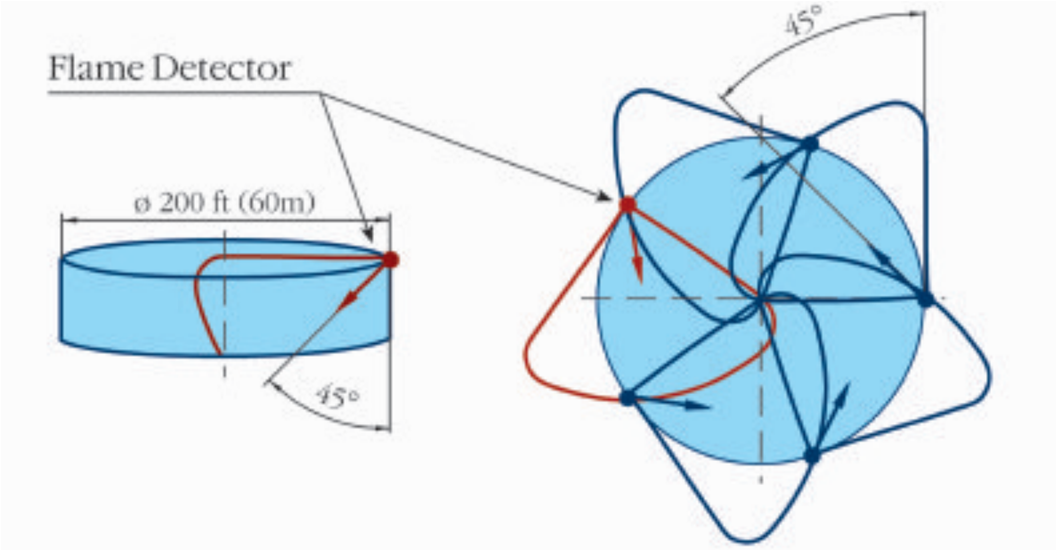

Figure 2 – Floating roof tank fire detection

fewer detectors, thus lowering the total cost and optimizing the performance of the fire detection system.

Whilst the IR3 flame detector is extremely sensitive, it also has a highly increased ability to distinguish between a real fire and false alarm sources and will detect flames in the presence of other common radiant energy sources such as welding or light sources (including Halogen and X-ray inspections). The detector is 100% solar blind.

Interfaced to a fire alarm system and an automatic fire extinguishing system, these unique detectors will provide optimal detection coverage and the safest and most reliable solution for storage tank protection. Optical flame detectors have been designed to perform under extremely tough industrial and environmental conditions.

With the combined CCTV/IR3 Flame Detector, operators can also utilize an integral colour CCTV to improve the 'out-of-hours' fire fighting response. Detecting a fire at its incipient stage by the infrared sensors and establishing its exact location and size by the colour CCTV camera, provides the ultimate solution to fire protection.

Triple IR (IR3) Flame Detectors incorporate three IR sensors to monitor the sensing wavelength and two other nearby wavelengths to discount unwanted or spurious alarms. This flame detection technique is the most relaible and immune to false alarms and offers:

- Fast response time
- Up to 215 ft (65m) detection distance over a cone of vision of 100°
- Highest Immunity to false alarms
- Built-in self-test for the electronics, sensors and window cleanliness
- 5-year warranty/150,000hr MTBF
- SIL 2 approved
- EN54-10/FM performance approved

With the combined CCTV/IR3 Flame Detector, operators can also utilize an integral colour CCTV to improve the 'out-of-hours' fire fighting response. Detecting a fire at its incipient stage by the infrared sensors and establishing its exact location and size by the colour CCTV camera, provides the ultimate solution to fire protection.

Location of flame detectors

The number of flame detectors and their locations in the protected area are determined by:

- The type of flammable materials that may be present. In some areas there will be a variety of fuels stored in different tanks
- The size/dimensions of the protected area and the distance to be detected
- The types of tank (fixed, floating roof, etc.)
- The sensitivity of the detectors – the size of fire to be detected
- Detectors' cone of vision (100° horizontal/vertical)
- Obstructions to the detectors' lines of sight.

Fire detection system for floating roof storage tank

The storage of crude oil and petroleum products in 'floating roof' tanks may result in vapour migration outside the o-ring seals and ignition to form a fuel fire that in time, if undetected, will destroy the seal and turn into a catastrophic fire. The roof of the tank floats on the oil and enables it to vaporize through the rim seal. Thus, there is no vapour phase below the tank roof.

Natural evaporation during movement of the floating roof or damage to the seal (ruptures,

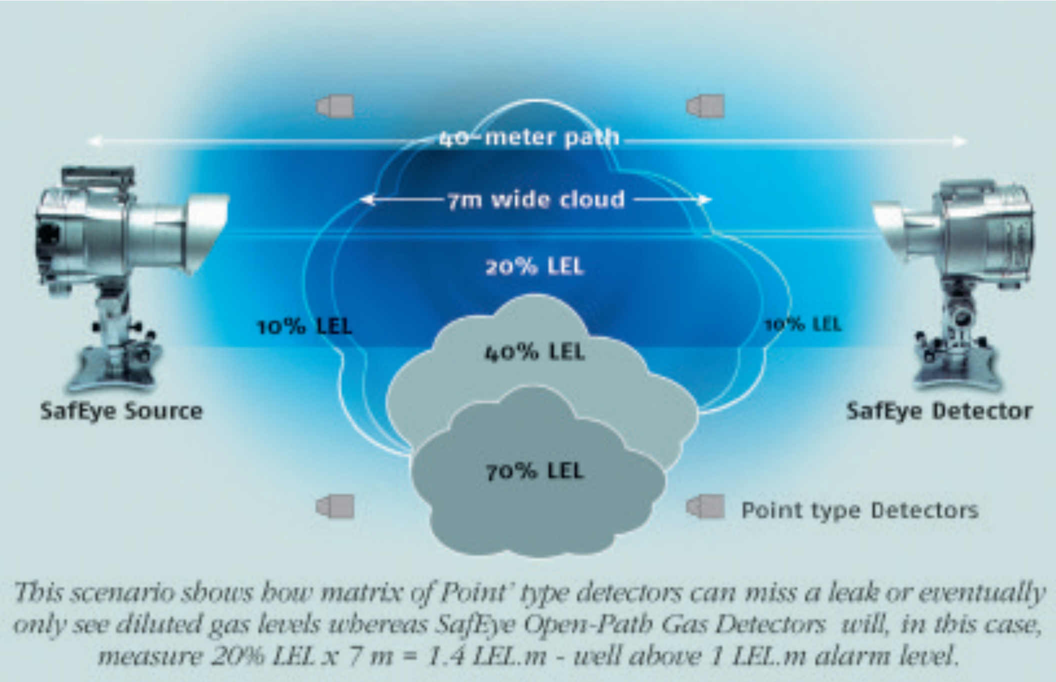

Figure 3 – SafEye open-path gas detection

thinning or degradation) can enable vapours to migrate outside, over the floating roof, and accumulate as hazardous explosive/flammable concentrations.

The existence of flammable vapours on the oil tank roof increases the fire danger. Thus, any spark or flame (especially lightning) in the vicinity of the oil tank roof may ignite the vapour and cause a fire.

The main problem here is the difficulty in quick response to the fire because the oil tank's shell hides everything that happens on the tank roof. This problem becomes more critical when the oil tank is not full and the floating roof is lower. Thus, a fire on the oil tank roof is detected only when it is large enough to be seen from outside the oil tank, but by then it may be too late and impossible to extinguish the fire. The solution to this problem is to have optical flame detectors on the oil tank roof (see fig 2) situated to view the full travel area of the tank roof for continuous detection of the oil tank's rim seal with very fast response time and a very high immunity to false alarms.

System configuration

The detector configuration depends on the size of the oil tank and the size of the site itself. Each oil tank is calculated as a detection zone. The detectors are located on the side wall (perimeter) of the oil tank. Each flame detector monitors a section of the rim seal and the tank shell. The number of detectors required for each oil tank depends upon the size (diameter) of the oil tank.

Gas detection

Open-Path "line of sight" Flammable Gas Detectors use optical spectral analysis of the hydrocarbon vapours escaping from various locations in the tank storage area to detect potentially hazardous conditions. They provide in-situ monitoring in the storage tank's immediate vicinity and around plant perimeters (fence line), over long distances of hundreds of feet.

'Point' type gas sensors detecting vapours emitted locally at a preselected location may complement the open-path gas detectors. These types of detectors can be used in congested areas where line-of-sight is not possible.

Open-Path Gas Detection Systems (see fig 3) are designed to monitor over long distances without effect from the environment or weather and are highly immune to false alarms. They comprise a transmitter (source) and receiver (detector) located at the ends of the desired detection path. Gas clouds passing though the path will absorb IR energy, emitted by the source unit and the detector senses the change and equates it to gas concentration. Measurment is in terms of LEL.m which is the combination of concentration and distance. For example, a 5 meter wide cloud containing 100% LEL (1 LEL) of the combustible gas would read 5 LEL.m . Alarms can be set at any point on the 0 – 5 LEL.m scale.

Location of open-path gas detectors

Not all gas clouds are hazardous – only if a flammable gas cloud or plume is wide enough to allow flame acceleration to speeds greater than 100 m/sec does it become a significant threat.

"Point" type detectors measure gas at their location in terms of % LEL, whereas open-path gas detectors measure the amount of gas anywhere along the length of the path, in terms of the integral of concentration and length (LEL x meters).

Location of the Open-Path Gas Detector is less important than with 'point' type detectors as it can provide a warning alarm from a diluted gas cloud and does not need to be close to leakage sources.

Location is determined by many factors, including:

- The specific vapours/gas(es) in the storage tanks (whether heavier or lighter than air).
- Expected leak trajectory, taking account of prevailing wind directions, release pressure, etc.
- Storage tank layout and ability to have unobstructed sight lines for the open path. IFP

The legislation clock is ticking for PFOS

But what about PFOA?

EU regulations banning the storage or use of firefighting foam concentrates containing Perfluorooctane Sulfonates – more often abbreviated to PFOS – come into effect in June 2011. John Allen explains.

By John Allen

EMEA Marketing Director, Tyco Fire Suppression & Building Products

The European Community has passed legislation banning foam concentrates containing PFOS. Under Directive 2006/122/EC of the European Parliament and of the Council of Twelve, December 2006, all materials containing PFOS – including firefighting foams – must not be used or stored after June 27th 2011. This will affect the fire and rescue service, industrial brigades and outsourced emergency response providers, although the scale of the removal and disposal challenge is not at all easy to determine.

In the UK alone, for example, a study commissioned by DEFRA (Department for Environment, Food and Rural Affairs) towards the end of 2004 indicated that, at that time, the UK fire and rescue service had 76,000 litres, while industry had 2,367,000 litres of foams containing PFOS. The high usage of PFOS in firefighting foams, when compared with other applications, was borne out by an OECD (Organisation for Economic Co-operation & Development) report in 2005 that showed that around 90 percent of the PFOS related chemicals in the EU were used in firefighting foams.

While all Tyco foams are now made with fluorosurfactants obtained by a different process called Telomer, which does not create PFOS, Tyco Fire Suppression & Building Products has put procedures in place to provide users of foam concentrates from any supplier that may contain PFOS with assistance to meet their obligations, and keep them updated on the issue.

But first, what is PFOS? PFOS is an impurity found in high concentrations in the Electrochemical Fluorination or ECF process that produces Fluorosurfactant or Fluorinated Surfactants compounds. These are synthetic Organofluorine

chemical compounds that have multiple Fluorine atoms, which are more effective at lowering the surface tension of water than comparable Hydrocarbon Surfactants.

The 3M organisation began producing PFOS-based compounds using Electrochemical Fluorination as far back as 1949. However, following the detection of Organofluorine in the blood serum of consumers, the detection of PFOS in blood from global blood banks, and the USA's EPA (Environmental Protection Agency) investigations, the company announced its withdrawal from the foams market in May 2000.

Nevertheless, PFOS is still to be found at levels exceeding the EU limiting values in all old stocks of 3M "LightWater" AFFF (Aqueous Film Forming Foam) concentrate for hydrocarbon fuel fires and AFFF-ATC (Alcohol Type Concentrate) agents for use on water-soluble polar solvent fuels such as Acetone, Isoproponal and MTBE (Methyl Tertiary Butyl Ether). After 3M left the market, a number of foam manufacturers filled the supply gap and provided a refilling service to 3M customers. The problem was that the blending of 3M PFOS foams with other foams, and even those not containing PFOS, will very likely result in a mixture that nonetheless exceeds the permitted EU tolerance of less than 50 ppm (parts per million) PFOS by mass and so require action under Directive 2006/122/EC.

So, what steps should be taken if there is any possibility that a foam stock may contain PFOS? If a system possibly still contains 3M concentrate, if it may have a blend of 3M concentrate and other concentrates, or if the foam was supplied by Tyco prior to 2000 – indeed, any foam stock that may be suspected of containing PFOS – the concentrate must be tested. If it is found to contravene the Directive, it will have to be removed, responsibly disposed of and replaced before June 27th 2011.

The first step is to identify if the foam contains PFOS. One course of action is to use the expert laboratory analysis facilities that Tyco has at its disposal. All that is required is a representative 200 ml sample for analysis (a sample kit is available from Tyco Fire Suppression & Building Products). A report will then be issued from an official external laboratory.

If PFOS is detected, Tyco Fire Suppression & Building Products can provide technical assistance regarding foam replacement and advice on how to check if other parts of the system distribution have been exposed to PFOS. For example, the cleaning of tanks or equipment might not be sufficient to avoid further contamination, as porous material can potentially re-contaminate a replacement foam not containing PFOS. The service also extends to the responsible disposal of foam containing PFOS and all other contaminated components, such as bladders from bladder tank systems.

Turning to the question of concentrates containing PFOA or Perfluorooctanic Acid, as yet there are no restrictions on their use. However "notice" has been given that PFOA is likely to be classified as being at least persistent, bio-accumulative and/or toxic and, as such, foams containing PFOA are very likely to be reviewed. This may lead to them being regulated in future, but it is important to note though that many manufacturers have already taken steps to remove both PFOS and PFOA from their products.

The regulation of toxic or PBT (persistent, bio-accumulative and toxic) chemicals in firefighting foams will impact on all users and holders of foam stocks. So much so that organisations facing decisions about the replacement of foam stocks are reasonably expecting reassurance from manufacturers that the replacement concentrates are not themselves going to be subject to future regulation.

With this in mind, Tyco issued a series of notices in October 2008, reminding customers that all Tyco European-branded products – Ansul, Sabo-Foam, Finiflam and Towalex – are free of PFOS and PFOA at all but possibly minute trace levels; well below the legislated limits set by the EU regulations for PFOS. Tyco will, on request, continue to provide all foam users with technical support and advice, whether the user holds Tyco foam or foams from other suppliers. IFP

John Allen is EMEA Marketing Director at Tyco Fire Suppression & Building Products. He can be contacted by telephone on +44 (0) 161 875 0402, by fax on +44 (0) 161 875 0493, or via email at marketing@tyco-bspd.com


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Pre-packaged Firewater Pumphouses

– The Way Forward

By James Shipman

Sales Manager, Patterson Pump Ireland Limited

The merits of the traditional on-site block-built construction fire water pump house are being very seriously challenged.

The increasing costs and the timescale to carry out the construction and fitting out of conventional buildings including the ancillaries such as electrical installation and plumbing are resulting in a rapidly increasing interest in the use of pre-packaged firewater pump house solutions.

The distinct benefit of the pre-packaged pump house is its single source responsibility (usually it is fully designed, manufactured and tested by the fire pump manufacturer within their facility), which ensures that all the equipment included is fully co-ordinated and the pump house is despatched from the manufacturer's facility tested and ready to be put into service within hours of arriving at its installation site if necessary. These systems are usually fully manufactured indoors which eliminates the dangers of equipment being temporarily stored on site with the associated risks of it being subjected to mechanical or weather damage when the completion of a conventional block-built building is running behind schedule preventing the satisfactory installation of the equipment as soon as it is delivered.

All existing fire pump configurations can be accommodated in this style; horizontal split case, end suction, vertical in-line and vertical turbine fire pumps together with their associated jockey pumps and ancillary equipment.

Naturally it is still essential that a correctly designed foundation is constructed prior to the delivery of a pre-packaged pumphouse to site and the building needs to be safely and satisfactorily anchored once it has been placed into position. However, the convenience that the pre-packaged solution provides is immeasurable when compared to a traditionally built pump house.

The concept of the pre-packaged pump house solution has evolved considerably over the last decade or so.

Initially, the majority of systems were based on standard shipping containers which would

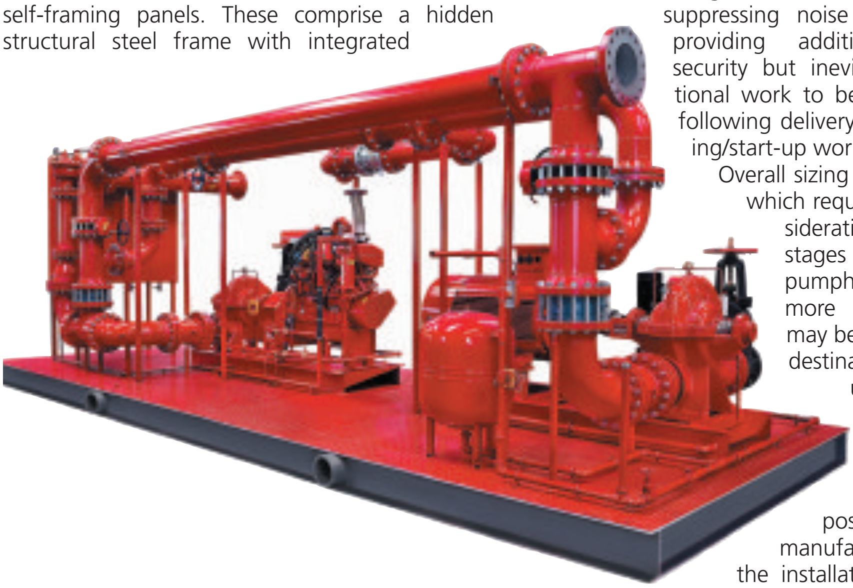
be structurally modified by strengthening the floor, adding access doors, ventilation louvers and pipework apertures to accommodate the equipment required. Whilst customised shipping containers are still used by some manufacturers, these do present some drawbacks. For example, the flat roofs on shipping containers can present challenges with weatherproofing, particularly when water and debris has collected and corrosion has begun to set in. Another significant negative is their aesthetic appearance. Without applying an expensive overcoat of cladding panels, it is difficult to disguise the fact that they are indeed modified shipping containers!

A more attractive solution is the construction of the pump house based on a steel space frame which is externally fitted with insulated building cladding panels. This provides for greater flexibility in the building design as it eliminates the internal dimensional constraints of standard shipping containers.

One of the latest innovations is the use of self-framing panels. These comprise a hidden structural steel frame with integrated interior/exterior panels, damp-proof membrane and insulation. I am aware that one fire pump manufacturer has been so successful with this style of building construction for their pre-packaged pump houses that it has resulted in their building fabricators establishing a new facility local to the pump manufacturer purely to service their own production requirements. Internally and externally, this type of pre-packaged building has an extremely professional and high quality appearance with no visible signs of the building framework internally providing completely clean and flat internal walls.

Pre-packaged pump house floor design varies depending upon the manufacturer. Some manufacturers prefer to provide steel decking or chequer plate flooring above the structural steel frame, other manufacturers leave the structural steel baseframe exposed to permit the entire floor area to be in-filled with concrete grout once the unit has been placed into its final position on site. The latter arrangement has advantages in terms of suppressing noise and vibration and providing additional base fixing security but inevitably requires additional work to be carried out on-site following delivery before commissioning/start-up work commences.

Overall sizing is a particular aspect which requires very careful consideration at the early stages of a pre-packaged pumphouse project. Whilst more than ample space may be available at the final destination at which the unit is to be installed, there are restrictions on the size of the unit for transportation purposes between the manufacturer's facility and the installation site. The extent



of the transportation size restrictions very much depend on which countries the units will need to be shipped through and research on this aspect needs to be thoroughly conducted before anything is finally designed and placed into production. That does not mean that pre-packaged units greater than a particular size cannot be produced however. The solution is to consider initially designing the project so that it comprises a multiple of sections, each co-ordinated to accurately fit together once they have been delivered to site. It is in the manufacturer's best interest in this situation to fully check that all the sections of the module fully align and correctly fit with each other before the unit is despatched to site otherwise very costly on-site rework with the associated delays in equipment handover can only be expected.

The increasing popularity of the pre-packaged pumphouse concept is also related to the rise in the number of 'standard model' logistics buildings, warehouses and supermarkets. Where the 'standard model' is replicated in different parts of the world for the same client, standardised designs of pre-packaged fire pump house can also be adopted.

Referring again to the aspect of single-source responsibility, the ability for a contractor to place one order which covers the provision of the pump-house, fire pumps, valving, test line, ventilation, heating, lighting, internal sprinkler system, hose valve headers, etc. is a very attractive prospect. Any issues of incompatibility with the internal items will need to be fully addressed by the system manufacturer during design, production and testing which eliminates considerable on-site time is resolving these. The system will have pre-determined connection points for the water suction and discharge lines, test line, electrical interfaces and drains. All site work that is ongoing during the period in which the pre-packaged pump house is being manufactured can be closely co-ordinated such that all interfaces are in position when the system arrives on site resulting in an extremely rapid time from delivery to the system being fully commissioned into full operation.

The increasing popularity of the pre-packaged pumphouse concept is also related to the rise in the number of 'standard model' logistics buildings, warehouses and supermarkets.

In the event that a client has surplus existing building space for their project, the pre-packaged concept can still be applied to a slightly lesser extent. Virtually the same equipment can be packaged together onto an open skid assembly to fit within a suitably-sized existing building although with this arrangement, it is usual for the client to look after the arrangements within the building for the electrical work, ventilation louvers, drainage, etc..

Pre-packaged systems can be produced to comply with all known fire protection codes and standards from EN12845 through to NFPA No 20 and FM/UL Standards. Particular local, regional and national codes and standards for requirements such as building and electrical regulations, can be fully accommodated covering such requirements as wind and snow loadings, etc.

In summary, the pre-packaged fire pump house has evolved into a viable commercial and technical solution for many firewater applications providing a distinct edge over conventional solutions where a rapid time is required from delivery to project completion and handover. IFP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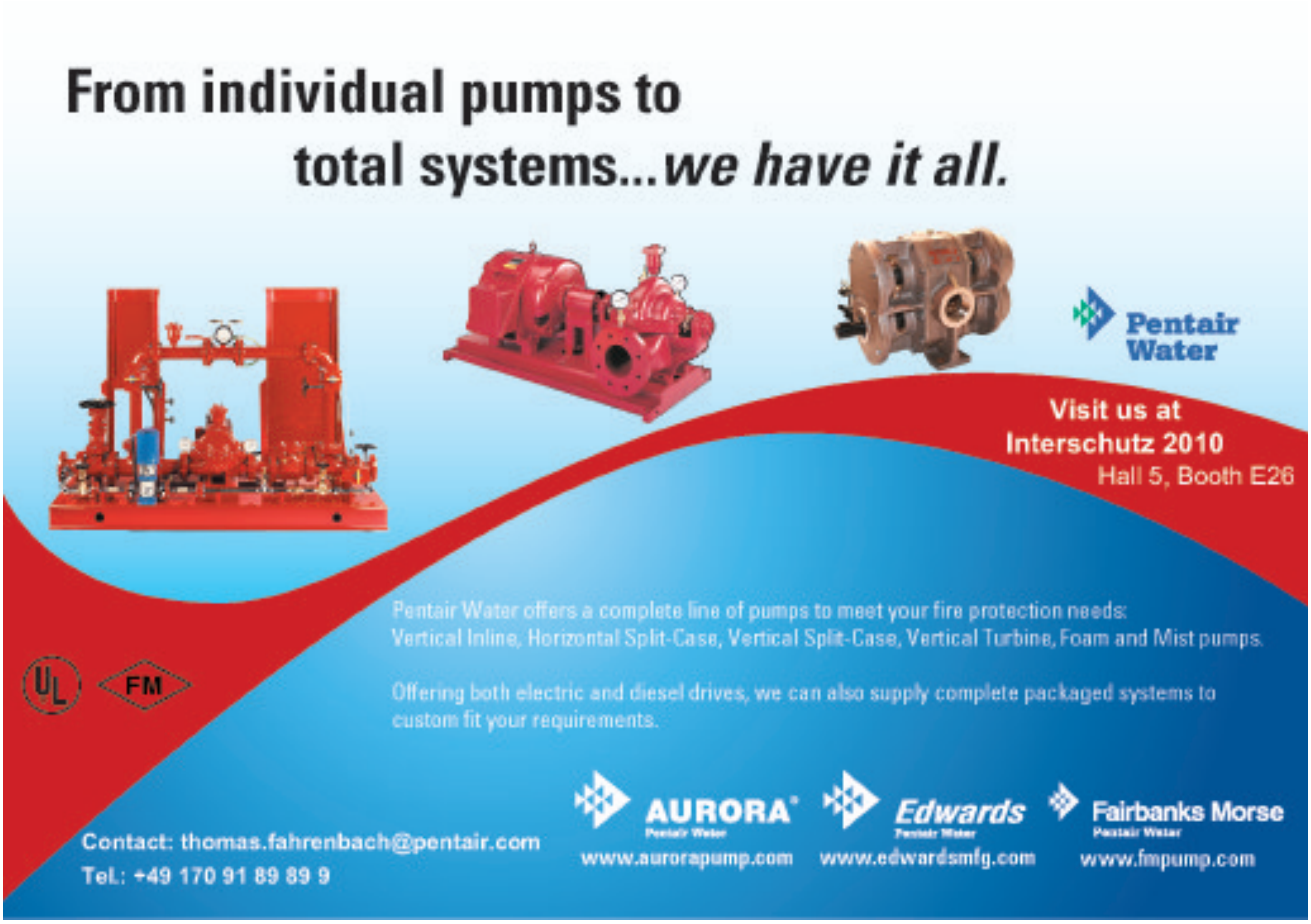
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High Pressure Water Mist

– Safe Protection for Archives and Libraries

By Ruediger Kopp (Dipl.-Ing.)

FOGTEC Brandschutz GmbH & Co. KG

Conventional fire fighting technologies such as sprinklers, gas, powder and foam systems, continue to have disadvantages in terms of resulting water damages, environmental compatibility, toxicity, or refill costs.

Often, the consequential damages caused by the extinguishing agent are greater than the potential loss by the fire. Therefore most buildings containing valuable goods are only protected by fire detection systems.

The benefits of fire-fighting with water in the form of smallest droplets have been known since the 1930-ies, but only have been identified for archive and library protection during the last decade. For many applications, high pressure water mist technology is a true alternative, reducing or avoiding the disadvantages occurring with other fire fighting agents.

Principle

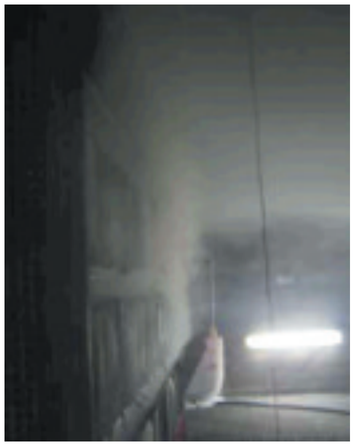
Water is the most effective cooling agent to fight fires. Conventional water based systems require large quantities of water to control or extinguish fires, mainly making use of the cooling effect. The primary reason for the large water amounts required is that the majority of the water is not effectively used to fight the fire, resulting into large water run off. This is due to the limited surface area of the water droplets getting into contact with the heat from the fire.

If water is atomized into very fine droplets, as it is with water mist technology, a substantially larger surface area is available to absorb energy and consequently fighting the fire. The fine droplets convert into steam at in the vicinity of the fire. Due to the vaporisation, the energy and the combustion rate of the fire are effectively reduced. Once the fire has been suppressed or extinguished, the droplets being discharged continue the effect by removing heat from the fuel source i.e. fabrics, wood, paper etc. and prevent re-growth or re-ignition of the fire.

Additionally to the cooling effect, the fast vaporisation results into a local inerting effect by volume increase of water, resulting into oxygen depletion in the direct vicinity of the fire. Different to other inerting agents this effect is a local effect

Photos from the course of fire





at the fire source, not reducing the oxygen concentration in the entire space.

Fire Tests

Water mist is not a gaseous agent and therefore can not be designed and approved like a gaseous agent. Likewise water mist cannot be directly compared with conventional sprinkler systems where design is based on two dimensional water calculations.

For each application the required nozzle type, droplet distribution, flow rate and discharge time have to be individually determined to provide the optimum protection of the relevant risk.

The International Maritime Organisation (IMO) has established guidelines for the approval and design of water mist systems in accommodation areas on board of ships. Similar to these test guidelines, protocols for light and ordinary hazard risk applications on land have been established by Factory Mutual (FM 5560 standard) and CEN (CEN/TS 14972 standard).

These standards and guidelines are today applied to generate design parameters and to approve system components. For some applications like Ordinary Hazard risks, the standards prescribe fire test scenarios to verify the system technology. The type of fire load and risk to be found within archives and libraries are normally not covered by these standard scenarios. Individual fire test protocols and scenarios have to be developed with fire experts to test the technology and to generate layout parameters.

An extensive test series for the above mentioned risks has been carried out by the French Fire Research Laboratory CSTB. Three different fire scenarios were evaluated, since these are typical for storage facilities for documents and other goods in archive and library environment.

The first test scenario included fixed shelves being filled with 900 archive folders. The second test scenario was created for areas with moving compact shelves. The dimensions and the fire load of the shelves were the same as in the test with fixed shelves, but each two shelves were arranged closed to each other with only a small gap. The third fire scenario was elaborated for storage areas containing plastic goods in shelved, e.g. video and data tapes.

The aim of the fire tests in all three scenarios was to control and suppress the fire, thus after automatic system activation each fire test was conducted for 30 minutes. After this test period the fire brigade entered the space and extinguished the fire using a high-pressure water mist fire fighting gun.

All fire tests have shown a rapid control and suppression of the fire as soon as the system has been activated. No fire spread occurred to the adjacent shelf. All temperatures in the area were rapidly reduced to a safe level, most below 50°C. The damages to the fire load mainly resulted from the time before system activation. All documents and goods were analyzed for damages after the test duration of 30 minutes. It was found that they were damp on the surface, but dry inside.

System set-up

High-pressure water mist systems mainly consist of a pressure generating device, a high pressure pipework and special nozzles.

The required operating pressure is generated by means of high-pressure pumps or pressure cylinder systems. The selection depends on the type of risk and the area to be protected. Larger risk areas such as archives and libraries are normally protected by pump systems. The main design features of high pressure pump units are similar to a conventional sprinkler pump, whereby positive displacement pumps are used due to the higher pressure levels required. A difference to conventional sprinklers is the water storage requirements. Due to the substantially lower water consumptions, water storage tanks are only 10% of the size of conventional sprinkler systems. In many cases the high pressure pump units are directly supplied by the public water main via a small intermediate tank. Maintenance requirements are

Scenario with fixed shelves

Nozzle arrangement in the library

comparable to conventional fire fighting systems.

The low water consumption also has a positive effect on the pipe dimensions required. Not only the flow rates are much lower than with conventional sprinklers, also hydraulic pressure losses of up to 70 bar allow to install the systems with pipe diameters of 10 to 50 mm. These properties permit installations in confined locations and ease retrofits in historical buildings.

The system can be triggered either by a separate detection system or by thermally activated glass bulbs. All system configurations known from conventional systems, e.g. deluge and wet systems, dry and pre-actions systems can be realized with water mist technology. Room heights up to five meters are protected with ceiling mounted nozzles. Higher areas, e.g. an atrium, can be protected by installing nozzles in different levels. Beyond that, it is possible to install wall cabinets with water mist extinguishing guns. These offer the possibility of rapidly suppressing initial fires, using the lowest possible consumption of water.

Case study

Due to substantial benefits of high-pressure water mist technology for archive protection, numerous smaller and larger storage areas for paper documents are today protected by this technology around the world. Among these is the Bizcaia Library in Bilbao, Spain.

Due to valuable documents stored in this library and the building being national heritage, there was a requirement for an automatic fire fighting system with minimum disturbance of the old building structure and reduction of the fire damage and consequential damages by the water discharged.

Since the building has an open ceiling structure with no false ceilings and only minimal space for the pipework installation, only small bore pipes routed along the ceiling and the walls could be used.

Additionally, no fixed fire zones could be defined. Large open areas demanded for an automatic fire fighting system, capable to rapidly control and limit the spread of a potential fire.

The system used to protect the reading hall as well as all book shelving areas of the building was designed based on specific fire tests independently carried out for storage areas of paper documents in shelve structures.

With small bore stainless steel pipes of diameters between 12 and 42 mm an architecturally pleasing installation without disturbance of the old structure of the building could be achieved.

A wet pipe system with glass bulb activated nozzles was used to protect book shelving areas, offices and technical areas. The nozzle spacings used for the water mist system are comparable to those of conventional sprinkler systems, but flow rates are substantially lower.

The entire pump system, including a 1000 liters break tank, has been installed in a room of only 10 m^2 floor area. Although the area is very small, the pump equipment is easily accessible for maintenance and test run purposes.

Conclusion

Even if water mist systems initially were mainly seen as alternative to gas extinguishing systems for machinery and special risk protection, more and more applications in areas that traditionally have been protected by conventional sprinklers are identified for water mist.

Due to partly higher initial investment cost and the lack of general design parameters, water mist systems will today not substitute sprinklers in most traditional applications, but they have found their market place for applications, like archives and libraries, where benefits of water mist technology over conventional sprinklers or gas extinguishing systems are recognized by users and insurers. IFP

Ruediger Kopp completed his studies of Chemical Engineering and Safety Engineering at the University of Dortmund as Diploma-Engineer. Since 14 years he is involved in the development, approval and marketing of high pressure water mist systems. At present he is Sales & Product Manager for these systems at the company FOGTEC Fire Protection based in Cologne.

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Audible and visual

In the great majority of automatic fire systems, the end result of the detection of a fire is the initiation of audible and visual warning devices that alert the occupants to the danger so that they can evacuate the premises.

By Neal Porter

Sales and Marketing Director E2S

Given the complexity and variation of different types of buildings and structures in which fire systems are installed, and the further variations to be found in the homogeneity or otherwise of the occupants, it is clear that, for maximum effectiveness, many different types of warning devices will be required. For example, at one end of the spectrum may be an offshore oil rig, which is manned by highly trained workers who operate under strict safety procedures at all times; at the other end is a large retail development crowded with shoppers who are unfamiliar with the general layout of the building or the position of the nearest emergency exit. Clearly, the technical requirements for the warning devices and the nature of the warning signals themselves will vary greatly. The key consideration for the system designer is how to produce clear, unambiguous audible warnings throughout the protected areas in the event of an emergency.

Voice alarms

Voice alarm systems have unfortunately suffered adversely from historic confusion with Public Address Systems, enshrined in most people's minds as the source of the muffled and incomprehensible announcements to be encountered in older railway stations. Thankfully, modern technology and the introduction of robust standards mean that this perception is now no longer relevant. The introduction of EN54-16, which defines the requirements for the control and indicating equipment, and EN54-24 that covers voice alarm loudspeakers, have defined test methods, environmental tests and performance criteria comparable with those required of sounders and strobes. It is worth noting that CPD compliance for such equipment will be mandatory from March and July 2011 respectively. BS5839-8, the relevant code of practice for voice alarm systems, defines five different types of system, broadly increasing in complexity to allow for more complex site and messaging requirements.

Voice alarm loudspeakers will typically combine pre-recorded standard or custom messages with a choice of pre- and post-message tones, enabling, for example, phased evacuation instructions to be broadcast in larger buildings. The E2S Appello range is available in industrial, marine and explosion proof versions, allowing the more sophisticated instructions of a voice sounder to be made available in both interior and exterior locations across many different operating environments. BS5839-8 indicates that as a starting point for system design the spacing requirement for voice alarms is broadly similar to that for traditional sounders, although intelligibility requirements and the wider frequency range associated with voice will normally require closer spacing when a detailed audibility survey is carried out.

Sounders

Many countries, such as Germany, France, Holland and Australia have a national 'evacuate tone'; the UK does not. The relevant standard, BS5839-1, merely states that the evacuate tone should

warning devices

contain frequencies within the range 500Hz to 1000Hz. However, for specific applications such as offshore use, specific tones are defined. Known as PFEER, Prevention of Fire, Explosion and Emergency Response, as a minimum, there must be provision for three types of alarm on the installation or platform:

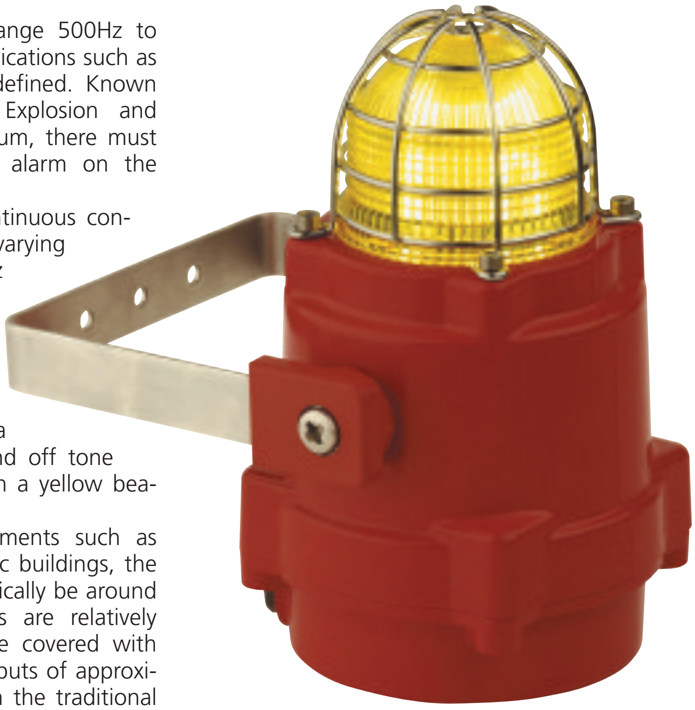
1 Prepare for evacuation is a continuous constant amplitude signal with varying frequency of 1200Hz to 500Hz over 1 second then repeated.

2 Toxic gas alarm is a constant 1000Hz tone reinforced where necessary with a red beacon or strobe.

3 Other cases for alarm (Fire) is a 1000Hz, 1 second on, 1 second off tone reinforced where necessary with a yellow beacon or strobe.

In normal commercial environments such as offices, hotels, hospitals and public buildings, the ambient background noise will typically be around 65dB, and most individual areas are relatively small. Such environments may be covered with multiple sounders with typical outputs of approximately 100dB(A) at 1 metre; even the traditional 6" bell is effective in small installations, although not particularly compatible with today's low-current control systems. BS5839-1 states that the effective distance of a sounder is when the calculated dB(A) is at least 5 dB(A) above the known ambient background noise, so the effective distance of a sounder in an ambient of 65 dB(A) is the distance at which the output level reduces to 70 dB(A). Using the inverse square rule/rule of thumb that the output falls by 6 dB(A) each time the distance doubles, the output will reduce by 30 dB at a distance of 32 metres.

In high background noise industrial environments, higher output devices are obviously needed, on large industrial and petrochemical sites and for civil defence requirements, electronic wide area sounders will normally generate multiple internationally recognised alarm tones including fire, security, civil defence, alert, COMAH (SEVESO II) toxic gas alarms and disaster warnings for flood, tsunami, tornado and other severe bad weather conditions.



Electronic sounders are increasingly replacing the traditional electromechanical sirens, hooters, buzzers and bells that have been the mainstay of the wide area warning device market for many years. Now, complex new digital to analogue

In normal commercial environments such as offices, hotels, hospitals and public buildings, the ambient background noise will typically be around 65dB, and most individual areas are relatively small.

although there is always the danger of installing units with too high an output; high output sounders should not be used in low ambient noise areas or as a means of "drenching" the area in sound. Alarm systems that are too loud may be dangerous, cause panic and discomfort and make communication very difficult, impeding evacuation procedures. The overall alarm level should be a maximum of 10 to 15 dB(A) over the ambient background noise.

Wide area sounders, with an output at 1m in excess of 140 dB, significantly higher than the human threshold of pain, have an effective warning range of between 500 and 750m depending on the atmospheric conditions. Used in quarries, conversion software and the latest in SMD class D amplifier technology enables E2S Hootronic sounders to mimic, in one product, an industrial hooter, high and medium frequency mechanical sirens, a buzzer and a bell with amazing fidelity. The operational advantages of replacing electro-mechanical devices with electronic equivalents are the savings in power consumption and weight; traditional sirens and hooters can be extremely heavy and often need three-phase mains power. Unlike electro-mechanical devices, the Hootronic range is continuously rated, requires zero maintenance, three remotely selectable stages are available and signal quality and performance will not degrade with age.

Strobes

It is becoming increasingly common in both commercial and industrial applications for visual signals to be required to reinforce the primary audible warning device. A visual signal should never be used by itself as part of a life safety system, although they are widely used by themselves in industry to indicate machine state or environmental condition.

Advances in lighting source technology have generated a number of alternatives to the traditional Xenon tube as the basis for strobes. In particular, high output brilliant white or monochromatic LEDs provide the benefits of low current draw, long life and simple electronic configuration and control.

The Xenon strobe beacon has the best light output to power input ratio and is the most widely used and versatile technology currently available.

The Xenon tube uses a very high voltage, generated by an inverter circuit, to break down the Xenon gas in the tube, creating an instantaneous brilliant flash of light, normally enhanced by using a ‘Fresnel’ lens. The light energy of the flash is a function of the Xenon tube size, the voltage across it and the capacity of the capacitor discharging into it. The Xenon strobe beacon has the best light output to power input ratio and is the most widely used and versatile technology currently available. Tube life is critical: it may be as little as 1 million flashes in cheaper devices but specifiers should typically expect 5 to 8 million flashes from higher quality units. However, traditional Xenon tube beacons cannot perform to their full potential when managed through intrinsically safe barriers for use in hazardous areas; the input energy that is allowed to pass through the Zener barrier or galvanic isolator is limited and consequently the

performance of the Xenon tube is severely compromised, significantly reducing its light output. In such cases, the solid-state LED (light Emitting Diode) unit has far greater potential. An array of ultra bright LEDs produces a bright flashing warning signal when powered through a Zener barrier or galvanic isolator, overcoming the restrictions associated with a Xenon strobe.

Hazardous areas

Hazardous areas are defined as areas where concentrations of flammable gases, vapours or dusts may occur, either constantly (Zones 0 and 20), under normal operating conditions (Zones 1 and 21) or unusually (Zones 2 and 22). A whole series of additional conditions relating to the temperature classification and the auto-ignition temperatures of the type of gas or dust to be found ensure that any equipment will not initiate an explosion or fire. Hazardous areas are to be found in a very wide range of manufacturing industries, far beyond the obvious petrochemical plants. Food, pharmaceutical and cosmetic manufacture all involve processing potentially explosive substances, while the problems of explosions in grain silos and sugar processing plants are very well documented.

There are two ways of ensuring that the sounder or strobe does not initiate an explosion when operated in a hazardous area: intrinsic safety of explosion proof. Simplistically, the input energy entering an intrinsically safe device is constrained

so that any arcing or sparking within the unit cannot generate enough heat to start ignition. The alternative approach, explosion proof, is to house the equipment in an enclosure that is sufficiently robust to prevent any internal explosion from reaching the outside. Clearly, explosion proof devices will, by their very nature, be bulkier, heavier and more robust than intrinsically safe ones, and are therefore more likely to be installed in external applications, particularly as they will be environmentally sealed to IP66 or IP67 in order to achieve the degree of protection required.

full 360° coverage; in order to minimise cabling costs, the systems are often battery powered and are radio controlled. As well as providing wide area coverage, such systems are often used on building and construction sites, where they provide excellent protection levels for the workforce. Typically, the sounders are initiated from radio manual call points, either through a system of master/slave control panels or directly if the system is self contained. Mobility is a key feature, with the individual units being moved around the site as the work progresses. Such systems are particularly useful on a temporary basis when construction work is being carried out on large or congested sites or for more permanent installations like those needing to meet obligations under the Control of Major Accident Hazard (COMAH) regulations.

Wide area sounders, with an output at 1m in excess of 140dB, significantly higher than the human threshold of pain, have an effective warning range of between 500 and 750m depending on the atmospheric conditions.

Wide area coverage

Wide area sounders, with an output at 1m in excess of 140dB, significantly higher than the human threshold of pain, have an effective warning range of between 500 and 750m depending on the atmospheric conditions. Used in quarries, on large industrial and petrochemical sites and for civil defence requirements, electronic wide area sounders will normally generate multiple internationally recognised alarm tones including fire, security, civil defence, alert, COMAH (SEVESO II) toxic gas alarms and disaster warnings for flood, tsunami, tornado and other severe bad weather conditions. Typically, systems consist of three individual sounders are pole-mounted at 120° to give

Conclusions

Sounders, reinforced by strobes, are the primary mechanism for alerting people in the event of an emergency. Voice alarms are also playing an increasing part in providing protection; whatever the warning system chosen, the primary function of the system designer is to ensure that the audible and visual output levels are adequate throughout the protected area. IFP

E2S is the world's leading independent signalling manufacturer. Based in West London, England the company designs and manufactures a comprehensive range of signalling products for industrial, marine and hazardous area environments.

Aspirating smoke detection

An example of an aspirating smoke detector in operation: aspirating detectors are particularly well suited to difficult conditions as here in a high-rack storage facility

The solution for safety-critical ambient conditions – when standard smoke detectors no longer provide adequate protection

There are many monitoring areas where fire detection using point-type fire detectors has its limits. Challenging ambient conditions and interference factors may rule out the use of standard smoke detectors.

By Stefan Brügger

International Product Manager, Special Fire Detection at Securiton Alarm and Security Systems

Such applications call for the use of special fire detection technology such as aspirating smoke detectors. And thanks to the new European product standard EN 54-20 today's aspirating smoke detectors (or ASDs) achieve new dimensions in detection speed and reliability.

The new European standard EN 54-20 has had a major influence on the use of aspirating smoke detectors. These automatic fire detectors are divided into three categories: Class A detectors for very high sensitivity; Class B detectors for enhanced sensitivity; and Class C detectors for normal sensitivity. And it is worth noting that the sampling hole of a Class C detector corresponds to the response sensitivity of a conventional point-type smoke detector.

In the past, tests focused on the response behaviour at the evaluation unit of the aspirating smoke detector. Today it is the response behaviour of the system as a whole that is defined, i.e. the aspirating smoke detector complete with sampling pipe, sampling holes or sampling devices and its accessory components. That's why it is no longer necessary to include maximum sampling time requirements in a system's specifications.

Approval requirements

The air-flow monitoring requirements have been made considerably more stringent, with even a 20 per cent change in the air-flow rate now detected as an error. But a 20 per cent change in air-flow rate does not mean that 20 per cent of the

ASPIRATING SMOKE DETECTION

detectors for early

sampling holes are simply covered up so that a function test can be carried out in the field. The aerodynamic connections are much more complex and only computational programs can supply binding results.

What's also important is that since 1 July 2009 the provisions of the Construction Products Directive 89/106/EEC state that only aspirating smoke detectors that are type-approved according to EN 54-20 and have the relevant Certificate of Conformity can be used. So any national standards for aspirating smoke detectors such as Austrian standard F-3014 or French standard CEA 4022 had to be withdrawn by that date.

The ASD 535 aspirating smoke detector from Securiton represents the new EN 54-20 generation of devices

The aim of the CE marking procedure is that in Europe a fire detection system and its components now only have to be tested and certified once by a notified body as a construction product based on harmonised European standards (hEN); it can then be used throughout Europe and bear the corresponding CE mark.

The CE mark used previously was affixed to the product on the basis of a manufacturer's declaration. What's new now is that the CE mark can only be affixed after testing and certification by a notified body and once the certificate of conformity and the declaration of conformity have been issued.

Design of aspirating smoke detectors

The planning of aspirating smoke detectors is regulated separately in each country: in Germany it is set out in VDE 0833 Part 2; in Austria, in TRVB S 123; in Switzerland, in the Technical Guideline for Fire Alarm Systems of the SES/VKF and in the UK in BS 5849-1 with the additional FIA Code of Practice for ASD systems. All these guidelines have now undergone revisions (or such reviews are about to be completed). In most countries aspirating smoke detectors are planned in such a way that one sampling hole corresponds to one point type smoke detector when it comes to the areas to be monitored. The starting point is an aspirating smoke detector that complies with EN-54-20, Class C. Class B aspirating smoke detectors can also be used in the case of halls with very high ceilings. As before, the highly sensitive Class A aspirating smoke detectors are used for early fire detection purposes, for instance in computer centres, clean rooms or other object monitoring applications.

Application

The main area of application of an aspirating smoke detector is not to replace point type smoke detectors. This only makes sense in the case of very large continuous monitored areas that all form part of the same fire zone for example in shopping malls or in large halls. Its principal remit remains the use in applications under difficult operating conditions such as:

- high humidity environments
  - steam baths, tropics
- high temperatures
  - large sauna installations
- low temperatures
  - refrigerated warehouses
  - outdoor applications
- very high ceilings
  - high-rack storage facilities
  - halls with high ceilings
- premises difficult to access
  - laboratories
  - cable tunnels
  - Ex zones
  - high-voltage laboratories
  - hollow floors and false ceilings
- premises at risk of sabotage
  - prison cells
- equipment monitoring
  - electrical/switchgear cabinets
  - telecom facilities
  - IT installations
- dusty environments
  - waste recycling
  - mills
- invisible fire detection
  - collections of cultural artefacts
  - museums
  - churches
  - modern architecture

Aspirating smoke detectors can also be used in very dusty environments

The new generation

The latest generation of aspirating smoke detectors is ideally suited to these operating conditions. The main features include a universal detector for all applications which can be complemented with a number of options; one or two high-quality smoke sensors in one aspirating smoke detector with adjustable response sensitivities; and an adjustable high-performance ventilator for large monitored areas featuring whisper-quiet operation.

Air-flow monitoring ensures that the sampling pipes are constantly checked for pipe breakage and the sampling holes monitored for pollution. A high-performance ventilator sucks the air from the room or facility being monitored through the sampling pipe to the evaluation unit. There the air is continuously evaluated by the smoke sensors. The display of the ASD system indicates the smoke concentration of the sampled air and alarm, fault and status messages. Any increase in the smoke concentration is detected very early on. Three pre-signals and one main alarm can be programmed for each smoke sensor and are signalled to the CIE (control and indicating equipment) via potential-free relays or directly to a analogue loop. There are four expansion slots in total to which additional relays, interface or memory cards can be installed in modular form.

The specially developed high-dynamic smoke sensor is the result of comprehensive research work. A high power LED combined with an LVSC sampling chamber (Large Volume Smoke Chamber) yields unparalleled adjustable sensitivity with minimum aerodynamic resistance and utmost resistance to pollution and soiling. These measures ensure a long system service life and durability.

Obsolete laser technology

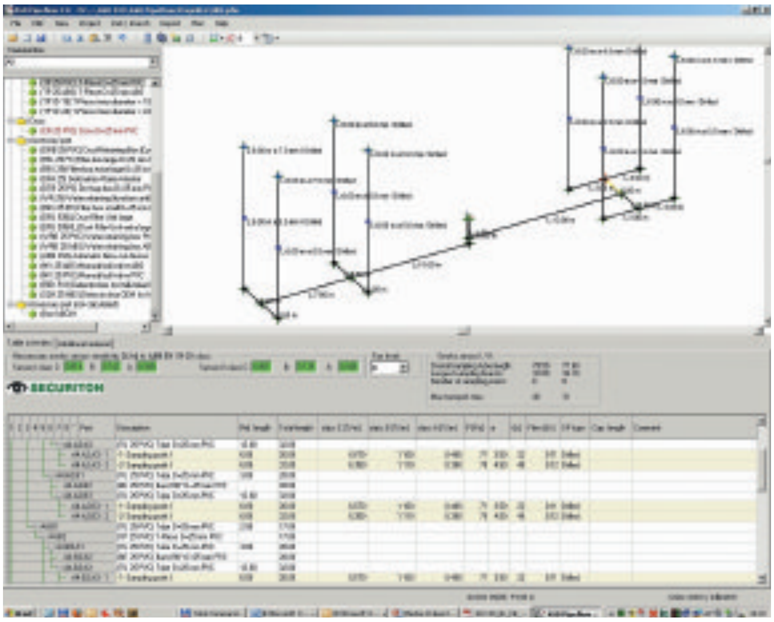
The actual core of the aspirating smoke detector is the smoke sensor and what is crucial here is not just its absolute sensitivity, but its long-term response under difficult ambient conditions. Lasers were long considered as synonymous with high sensitivity. But today there is no doubt that the technology of a high-power LED offers significant advantages. Firstly, the useful temperature range is much greater; secondly, it has a much longer service life than a laser diode. With the vast measurement volume of >1cm^2 and very fast measurement times (up to 100 measurements per second) particles are now measured several times, which allows the use of a patented electronic particle suppression system capable of filtering out large individual dust particles. Overall reliability is boosted enormously as a result. The large measurement volume also means that a dynamic scatter angle range is achieved from the forward scatter to the extreme backward scatter, which detects every possible size and colour of smoke particle equally without the need for additional measurement systems (2 wavelengths).

The latest generation of aspirating smoke detectors is ideally suited to very harsh operating conditions and detects a multitude of fire risks.

Commissioning and functions

Many installers shy away from familiarising themselves with new aspirating smoke detectors. And yet the new generation of aspirating smoke detectors offers considerable advantages. On simple standard systems for instance the aspirating smoke detector can be activated without a PC and

ASPIRATING SMOKE DETECTION



The ASD PipeFlow sampling pipe computation software allows asymmetrical sampling pipes

the main settings carried out on the building site itself. A PC tool is also available for expert users; it provides the full range of setting possibilities via a USB interface and allows the data to be visualised.

In difficult ambient conditions in particular it can be very important to record and display all the ambient data during a trial phase lasting several months. And with an optional Memory Card module and commercially available SD storage cards it is also possible to record the values for impaired visibility and airflow for up to a year on the aspirating smoke detector – without an additional PC – and then analyse the data in the office using Microsoft Excel.

An extensive range of accessories is available (e.g. alternative sampling pipes, sampling holes, filters, water retaining boxes, detonation flame arresters). These accessory components are also tested and certified along with the aspirating smoke detector in accordance with EN 54-20. The range of accessories must be listed in full on the certificate issued by the notified body.

With the optional interface the aspirating smoke detector can be ideally integrated into the fire detection system. It is then very easy to display and adjust the day and night sensitivity, for example, from the fire alarm control panel.

Planners of sampling pipes all know that the design of the installation always had to be symmetrical, which is why T- or H-shaped configurations were used in most cases. However this is not always the optimum solution, particularly on larger premises, and compromises sometimes had to be made due to the space needed by the sampling pipes. But now with the new sampling pipe computation software ASD PipeFlow asymmetrical sampling pipes can be used as well. This results in sampling pipe savings of up to 20 per cent and a further improvement in response time. The only requirement is that the sampling-hole diameter calculated using the software be observed accordingly also at the implementation stage.

Soundproofing included

Most operators of fire alarm systems do not want to hear or see anything of their fire detectors: they just want them to monitor things quietly in the background and then leap into action at the crucial moment. But until now the use of aspirating smoke detectors was limited in applications where noise was an issue as the aspirating noise (the fan in particular) was audible. In most cases it meant that an expensive housing or even special versions of the aspirating smoke detector had to be used. Not so with the latest generation. Thanks to the adjustable high-performance ventilator sufficient air samples are now aspirated even at the whisper-quiet fan level 1 to enable the implementation of large aspirating configurations. ISO 11690-1, i.e. the recommended practice for the design of low-noise workplaces containing machinery, is complied with just as easily as DIN 4109 on sound insulation in buildings, which means that aspirating smoke detectors can be used even in inhabited areas such as hospitals and retirement homes.

Summary

The aspirating smoke detector is a multi-talent that can be used practically anywhere. It includes not only room protection applications (such as high-rack storage facilities, dropped ceilings and raised floors, large halls, museums, galleries, theatres, airports, computer centres) but also object monitoring (such as distribution cabinets and EDP installations). Thanks to the new technology the equipment is even quieter, more resistant and more reliable when it comes to false alarms; what's more it is more responsive than ever before. IFP

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Draka is one of the world's leading cable manufacturers

Getting to grips with counterfeit cables

By Mark Froggatt

Marketing Services Manager, Draka UK

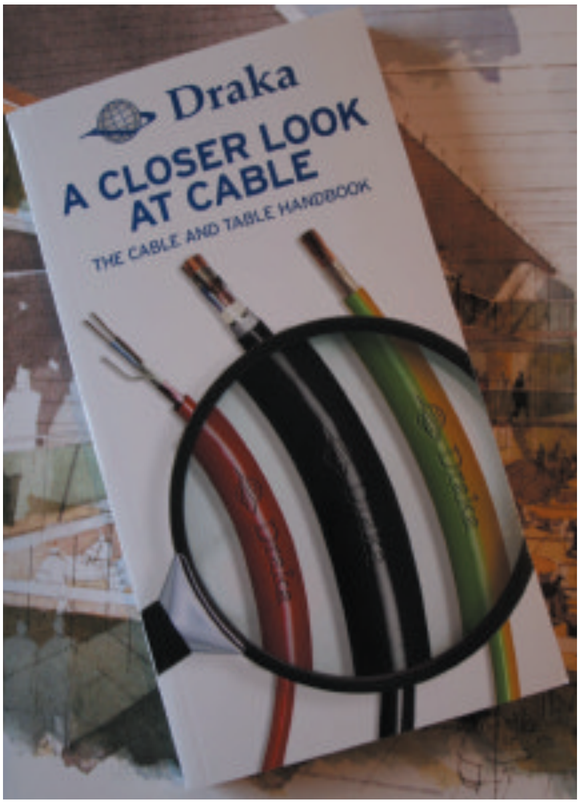
Just about every sector of the fire protection business now seems to be targeted by counterfeiters and rogue manufacturers. Nowhere is the risk greater than when the product is electrical cable. But what can be done? Mark Froggatt explains.

The first thing to appreciate about counterfeit cables is that they are almost always sub-standard, posing a life-threatening risk to installers and end users. The second, and perhaps more harrowing realisation is that these rogue manufacturers are not in the least bit concerned about anyone's welfare; their total focus is on making a profit. Their game plan does not stretch to protecting their company's reputation, establishing integrity, providing safe products or building a reputable brand. No, it is all about money.

Ironically, the very fact that there are standards and regulations that bona-fide cable manufacturers adhere to can help the counterfeiter to dupe the unsuspecting wholesaler, distributor, installer or fire engineer. These rogue manufacturers and suppliers are more than willing to lay claim to standards that are totally fraudulent; unwarranted BS, EN or other acknowledged standards are often to be found displayed on the rogue cable sheathing. So, everyone in the trade – wholesalers and stockists; contractors and installers – need to check very carefully that the cable being supplied does meet the required standards and not merely claim to.

This scenario, understandably, alarms reputable cable manufacturers as it undermines confidence in the standards to which their cables are manufactured and used.

But how big is the problem? Although precise figures are difficult to come by, reliable UK industry estimates indicate that as much as 20 percent of the cable being sold and installed in the



Draka's Cable and Tables Handbook covers a host of technical and legislation issues

UK currently is counterfeit, unsafe, or both. Annually, around £30 million of counterfeit electrical products are believed to reach British shores and those with an intimate knowledge of the problem assess that the vast majority emanates from China.

Today, cables can be found where the diameter of the copper wire has been reduced, lowering the current rating and increasing the resistivity of the cable. This could potentially result in overheating, which could lead to fire or reduce the level of safety against electrical shock. There have also been numerous instances where materials other than pure copper, such as steel wire, copper-coated aluminium or badly recycled copper have been used in cables, and instances where the insulation or sheathing is sub-standard are also commonplace. In many instances, of course, it is not easy to detect a rogue cable simply by looking at it.

Although it is difficult to assess the precise impact that this is having, it is a fact that, in the UK there is strong correlation between the increase in cable-related fires and the amount of unapproved and counterfeit cable entering the country. According to statistics from the Department of Communities and Local Government, in 2007 there were 4,093 fires in homes and businesses in England alone that were caused by faulty wires and cables. This equates to 27 percent of all electrical fires. In the past five years 15 people have died in fires due to faulty cable and 1,200 have been seriously injured. Of course, in many major fires the damage is so extensive that often investigators are unable to establish the precise cause of the blaze. So the government's figures may well grossly understate the number of fires that can be attributed to faulty cable.

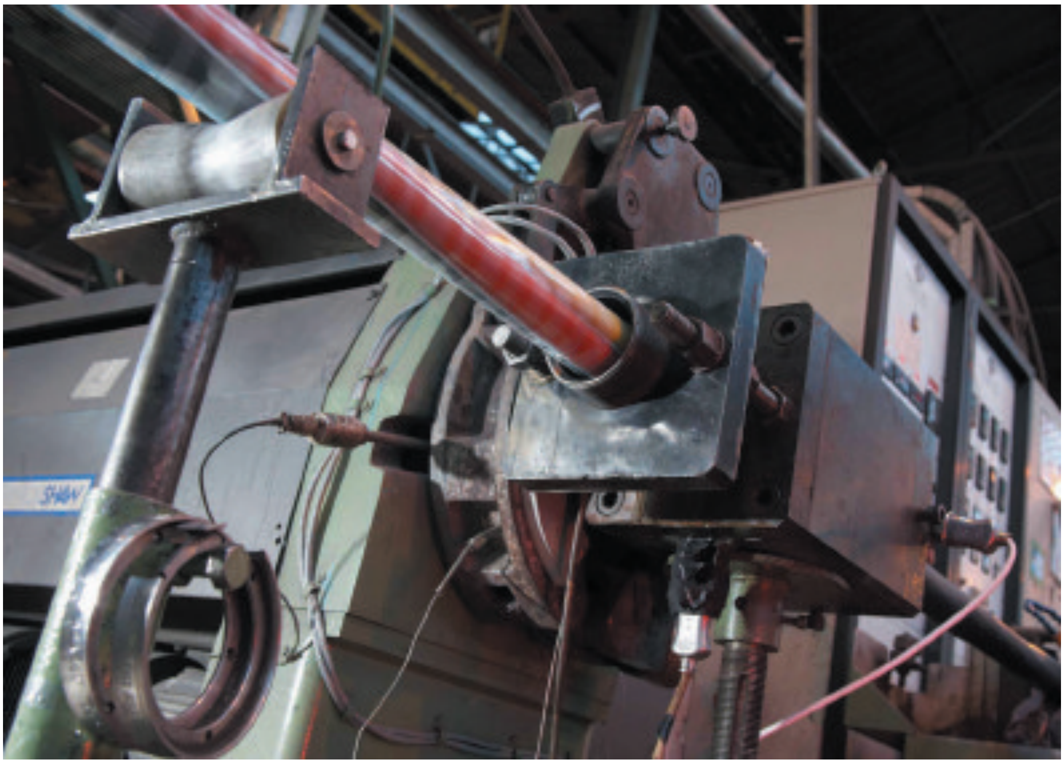
The question, of course, is what can – indeed should – be done?

The first thing to acknowledge is that everyone in the industry has to be involved and accept their legal and moral responsibility. While the majority of distributors and installers that have used sub-standard cable have done so innocently, it would be wrong to believe that there are no instances where a "blind eye" has not been turned in the quest to reduce costs. Certainly, there has been sufficient international publicity about the issue to argue that nobody in the industry can reasonably claim not to be aware of the problem.

The first step that needs to be taken may seem obvious: take a very close look at the cable being offered and supplied. Draka is currently focusing much-needed attention on the absence of cable marking, without which there is no means of establishing the cable's authenticity. In the absence of such marking there is every probability that the quality and performance of the cable is highly suspect and is from a disreputable supplier. Under the banner: "If it's not marked, it's not worth it", the Draka campaign focuses on the fact that there is a legal obligation to include certain information on the cable; the more demanding the specification, the more information is required to be shown.

But what markings should a cable carry? To help installers, Draka has published a pocket guide and has an explanatory video presentation on its website. Both are available at www.drakauk.com. Among the markings that should be clearly visible on every cable are the manufacturer's name and the British Standard number to which the cable claims to conform. Providing the cable has been tested by one, the name of the independent third-party approval organisation should also be included.

The next step is always to corroborate that what you are being told or shown on sales literature or websites, and that the markings on the cable itself are not misleading, incorrect, or simply downright dishonest. However, relying on the manufacturer's or supplier's assertions that a cable is manufactured to a specific standard simply will no longer do; ask for copies of test or membership certificates. Better still, use only cable that is supported by independent test certification by fully accredited organisations that, in the UK, are themselves accredited through UKAS, the United Kingdom Accreditation Service. This is the sole national accreditation body recognised by the government to assess – against internationally agreed standards – organisations that provide certification, testing, inspection and calibration services. The UKAS website contains information on all of the accredited organisations and can be found at www.ukas.com.



Draka runs regular factory tours to demonstrate the integrity of its cable offering

The importance of this third-party accreditation lies in the fact that the specifier, the trade supplier and the installer can be sure that the cable being supplied today is built to precisely the same standard and specification as the cable that was originally tested and approved. If the cable is from a producer that does not have this third-party accreditation there is, in reality, no guarantee whatsoever that it is manufactured to the standard being claimed for it.

This requirement for third-party accreditation is important even when buying cable from a well known manufacturer. Without it, while earlier cable from that supplier may have been up to the standard claimed for it, re-sourcing materials and accepting a different specification, changing the formulation of the coating or sheathing, or modifying the design are just examples of changes that may have affected the performance of the cable.

It is important though to remember that rogue cable manufacturers are every bit as willing to fake third-party accreditation as they are BS or EN standards, so always check with the accreditation organisation that the claim is genuine. They are also quite prepared to misrepresent their accreditation. In one instance, a company's sales literature proudly carried the logo of one of the world's leading product certification organisations. In this particular instance, the company had every right to include the logo, as it had achieved an international quality management standard. However, the way in which it had been included on its literature might easily have been taken as implying that the products themselves had been tested and approved.

So surely the message is clear. The more difficult we make the counterfeiter's life and reduce his chance to make easy money, the sooner this scourge will come to an end. But, this will not happen on its own; we must all play our part to the full. Wholesalers and distributors must verify the quality of the cable they are stocking; contractors and installers must be equally diligent and avoid buying cable from suppliers that have shown to be prepared to side-step the issue; and fire engineers and building services consultants should be ever watchful for substandard product substitution. IFP

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In-house test facilities complement rigorous third-party testing

Fire protection of Structural Steel by Intumescent Coatings

Dr Daniel Brosch

Global Product Manager PFP in PPG Protective and Marine Coatings

Fire protection can be obtained by different methods.

There is "active" fire protection comprising fire detection and extinguishing methods on one side. Passive and reactive fire protection materials contribute to the fire resistance of structural steel by insulation from the heat of a fire. "Passive" means the product provides the insulation in as it has been installed and does not change in the case of fire. Reactive materials such as intumescent coatings are installed as a relatively thin layer of a coating that under normal conditions does not provide insulation. But in case of a fire a chemical reaction triggered by heat is taking place The coating changes and forms a thick layer of char insulating the steel covered by it from the fire.

Intumescent coatings are often used to protect structural steel from fires. Steel loses its load bearing properties when heated. Applying an intumescent coating to steel columns and beams will maintain their load bearing capacity and preventing buckling and collapse of a steel structure for a defined time. This buys additional time for people to be evacuated and to fight the fire.

There are intumescent coatings that protect steel form cellulosic fires in civil buildings but also special types to fire protect steel on oil and gas installations onshore as well as offshore from the most extreme fire conditions such as hydrocarbon pool and jet fires. These "thick film" coatings are in general based on 2 pack epoxy formulations.

Apart from protecting the steel from fire, intumescent coating systems also provide corrosion protection.

Intumescent coatings for protection of steel from cellulosic fires are normally 1 pack products. They are also known as "thin film" intumescents. Their application is very much like paint by airless spray resulting in smooth surfaces. Structural steel members fire protected with intumescent coatings preserve their appearance. This is of major importance in modern architecture, because the steel columns and beams are often visible and meant as design feature of buildings, such as airport, hotels and sports stadia.

To proof their "fitness for purpose" intumescent coatings have to undergo a demanding fire test regime. Fire tests of several types and sizes of steel columns and beams are conducted at standardised conditions by accredited test facilities. In these fire tests the intumescent coating system has to proof it ability to keep the temperature of a steel section under a certain level, the critical temperature for a given time period, such as 30, 60, 90 or 120 minutes. From the fire test raw data tables with film thicknesses of the coating for different types and sizes of steel sections are derived. In many cases these assessments finally have to be verified by an independent party, often a state authority by means of certification.

The film thicknesses stated in the tables are meant as minimum dry film thickness of the intumescent coating excluding the film thickness of primer or topcoat.

Although all intumescent products share the same basic principle of how they contribute to the fire resistance of structural steel members, not two have the same film thickness tables.

The thickness of the intumescent coating required for proper fire protection is also depending on the type and size of the steel section, the type of fire, the protection time and local regulations.

Because every country normally has its own standard for fire testing and local building regulations the way of testing and the critical temperature tested to may vary by country. In the European Union it is intended now to harmonise the local fire testing standards in the member states by introduction of EN 13381. Because prEN 13381-4 has not differentiated between passive and reactive fire protection part 8 of this standard has been developed. The final draft is out for voting now. Also a part 9 is worked on presently, taking care of fire protection systems applied to steel beams with web openings.

To form a fire resistant coating system meeting the demands of the regulations the correct choice of primer and topcoat is essential. By choosing the wrong primer or sealer the fire performance of the intumescent can be affected adversely and lives and assets put at risk. The intumescent coating manufacturers normally have tested various primers and topcoats for compatibility with their intumescent coatings to ensure sufficient fire performance of the full system.

Further to the correct product choice the preparation of the steel substrate and application of the coatings to the steel are important for the final performance.

Intumescent coating systems can provide efficient fire and corrosion protection in many areas. They are particular suited for applications where aesthetics or weight are issues. IFP

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Fire and life safety s level and mixed-use

Successful retail projects today benefit from a comprehensive approach to fire protection and life safety. This article discusses the ways in which the application of such an approach can affect the layout, design and construction of a project. Further, it describes how such an approach may result in savings for the retail developer, and a more successful enterprise for the design and construction team.

Kit Bryant AIA

and

Jeremy Mason, P.E.

A recent project completed in Dedham, MA serves as a good case study. Legacy Place, a development partnership between W.S. Development, Inc. and National Amusements, Inc., is a new Lifestyle center consisting of 675,000 square feet of leasable space located at the intersection of Routes 1 and 128 in Dedham, MA. Early in the development of the project, the developer engaged Rolf Jensen & Associates (RJA) to assist their design team of Prellwitz/Chilinski Associates, Inc. and spg^3 in better understanding the fire protection and life safety issues the project might encounter. RJA initially provided an analysis of the building codes enforced by the local authority having jurisdiction (AHJ) and an approach report that set out the options for best conforming to those codes. The approach report provided the design team with multiple scenarios for the construction types for the various buildings, the separation requirements between use groups and the associated fire and life safety systems. It also provided the design team with an outline of the major fire protection and life safety code issues that the various buildings would need to address.

Mixed use parking retail applications

Large retail projects, both open air and enclosed, have become more complex in recent years. Land values and parking requirements limit the amount of buildable land available for development, often resulting in denser, multi-level mixed-use projects. Stacking of diverse uses, such as retail over parking and parking over retail, and assembly and residential over retail or parking, can create fire protection and life safety challenges.

To accommodate the leasable square footage required to make the project economically viable, and the parking required to support that leasable area, it was necessary to construct portions of the project as mixed-use buildings. For instance, while there is substantial at grade parking, the majority of the required parking is situated in three levels of open parking garage located above ground level retail spaces.

The newer model codes are set up to deal with a mix of parking located above and below various retail occupancies. Generally, the model codes require that the lower occupancy be separated from the occupancy above by a 3-hour fire resistance rated horizontal assembly. When separated by such an assembly, the spaces above and below are permitted to be treated as separate buildings with differing construction types. This offers the developer a significant opportunity to save money in protecting the structure of the building (generally fireproofing) and potentially eliminating sprinklers, as was the case in the open parking garage at Legacy Place.

The at-grade retail was designed and built as Type IB (Protected Noncombustible) Construction and was fully sprinklered. Above the retail application was a 3-hour horizontal floor/ ceiling assembly which separated the at-grade retail spaces from the three unsprinklered parking levels. The parking

olutions for multi-spaces

levels were designed and built as Type IIB (Unprotected Noncombustible) Construction. The 3-hour horizontal assembly subdivided the project into two separate buildings of two different construction types. This approach saved the developer substantial money by eliminating the need for fireproofing and sprinklering the open parking garage structure on the upper levels.

Properly planning for future tenants

Retail spaces often need to accommodate varying uses such as mercantile, business, and assembly. Because the developer's leasing efforts continue throughout the design and construction process and even over the life of the project, many of the uses will not be determined until the shells of the buildings are already constructed. For all of these reasons, a comprehensive approach to fire protection and life safety initiated at the start of such a project can provide significant benefits to the developer and their design and construction team.

For example, the occupant load of retail applications at grade or one story below grade is calculated at 30 square feet per person while restaurant type assembly spaces are required to be calculated from 5 to 15 square feet per person. This difference in possible occupant load factors can have a significant impact on the number and location of exits that are required. Thus, a retail space of 1,400 square feet would only require a single exit as a mercantile occupancy while the same space if converted to an assembly occupancy would need two exits.

Further complicating the matter is the fact that egress for the general public is not permitted to pass through commercial kitchens or through stock rooms in retail applications unless there is a 44-inch wide aisle defined by partial or full height partitions. Thus, properly locating exits from the start can give developers maximum flexibility in leasing their spaces to various tenants and occupancy types.

Spacing between buildings on a limited site

Many developers strive to construct their buildings to be one story in height. The model building codes permit one story mercantile or business buildings to be of unlimited area and to be built of any materials except wood framed construction, given that 60-foot side yards are provided between buildings and the buildings are fully sprinklered. As long as the buildings are spaced far enough from one another, this approach allows developers to build large retail strip malls with no fireproofed construction and at a substantial cost savings. This approach also results in a trade-off when the site is of limited area. Unlimited area buildings can save the developer significant construction costs, but they require more site area because the buildings must be spaced appropriately apart. RJA played an integral role at Legacy Place by helping to properly place adjacent buildings to maximize cost savings, and at the same time helping to make sure the developer achieved their goals for leasable area.

It should also be noted that restaurants, considered assembly occupancies, are permitted in unlimited area buildings but in only small proportions and must be separated from the balance of the building with two hour rated construction.

Assembly occupancies mixed with retail

Mixing assembly spaces with other retail applications is a fast growing trend in retail development. This provides added benefits to developers beyond just filling lease spaces. It expands the options for their customer base and the time those customers may shop at their development. However, because of the increased occupant load, the code generally requires a higher level of protection for assembly occupancies than for mercantile occupancies.

The multiplex cinema at Legacy Place provides an example of such an assembly occupancy mixed in with retail occupancies. The multiplex cinema is located on the second and third levels of one of the retail buildings, above retail and other entertainment spaces. The initial fire protection and life safety code compliance report identified several code related issues that were the result of the mixed occupancies and made corresponding recommendations.

At Legacy Place the multiplex cinema has an occupancy load of approximately 3,000 people. Additionally a waiting population of 800 people was assumed based on the capacities of the two

largest auditoriums. A strict interpretation of the building code would have required a larger waiting population (based on square foot calculations per occupant in the waiting/lobby areas). The design team was able to demonstrate, based on an analysis of movie start and stop times at similar multiplex cinemas, that use of the capacities of the two largest auditoriums as a worst case scenario for a waiting population would be more than adequate. However, even with this reduced waiting area population the total occupant egress capacity for the cinema required a significant amount of exits and exit capacity. To address this capacity the design team created an egress approach similar to one used for cinema projects located on grade. This approach gave the cinema occupants a straightforward and intuitive means to egress the building (studies have shown that occupants will, during an emergency, first attempt to egress the way they entered).

Early involvement by RJA with the authority having jurisdiction (AHJ) during the development of this equivalent egress approach successfully allayed their legitimate concerns about the ability to safely egress so many occupants from the upper levels of the building. These early meetings helped the design team better understand the AHJ's major concerns and allowed the AHJ to better understand the projects goals and approach. In addition, by preparing life safety drawings, the design team was able to show the AHJ how egress should function. These drawings could also be used as a resource in the future by the design team and the AHJ to ensure that proper egress will still be provided if renovations occur. Laying this early ground work helped keep the project focused and on track and resulted in fewer misunderstandings between the AHJ and the design team and resulting in consequential changes.

Because the area required for the intended uses was large, the fire protection analysis recommended that the multiplex/ retail building be of Type 1B non-combustible and protected construction, allowing it to be of non-separated mixed-use and unlimited area. The main entry to the building consisted of an unprotected two story space between the first and second floors and the cinema contained a two story lobby from the second to third floors. The initial report also recommended that the cinema be separated from the remainder of the building to prevent the connection of those multi-story spaces. This prevented those multi-story spaces from being considered a three story atrium which would have triggered the requirement for a smoke control system in the building.

Fire alarm systems in retail applications

The design and installation of fire alarm systems can have a significant impact on retail applications. A system with separate panels for each tenant that connect into the master building fire alarm panel can ease the burden when new tenants arrive or leave. In addition, having a single contractor who is responsible for the entire building, not just individual tenants, can ensure that the work is done efficiently and on time.

While not used in the cinema at Legacy Place, a phased evacuation scheme tied to the fire alarm system is an option that may be considered in similar assembly occupancies. Because of the large number of occupants in a modern multiplex cinema, phased evacuation can increase safety by sequentially allowing occupants to egress from the various auditoriums. Instead of all of the occupants attempting to exit at the same time (3,800 people in a cinema such as the one at Legacy Place) several hundred at a time are directed to egress. This phased evacuation process is typically controlled through voice commands that first egress those spaces and auditoriums closest to the origin of emergency event followed in a planned sequence by the remainder of the building.

In conclusion, retail developers are facing new challenges as the types of tenants they covet are changing and as the land available for development is constricting. For these and other reasons it has never been more important for developers and their teams to address fire protection and life safety concerns up front. By being proactive they can help assure that the numerous and often restrictive requirements contained in the building codes do not conflict with the goals of the development. IFP

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Apathy, ignorance and denial

– ASFP President spells it out

More than 100 guests attended the Association for Specialist Fire Protection (ASFP) annual President's Lunch, at the Palace of Westminster in December, to hear ASFP President Brian Robinson spell out the current problems with regard to the control of fire protection in the UK.

By Brian Robinson

ASFP President

"I have been questioning whether the Regulatory Reform (Fire Safety) Order 2005, the CDM Regulations 2007 and Regulation 16B of the Buildings Act were working together to raise installation of appropriate fire protection measures" he commented. "Have matters improved? Sadly, I think not".

He blamed the lack of a national audit procedure and claimed that the biggest challenges faced by the industry were apathy, ignorance and denial. "We all recall the scene of the tragic fire at Lakanal House that unfolded on our television screens recently, in which six people sadly lost their lives. At the time, the media were asking the obvious question – how could this happen? Lakanal House gained national media attention because people died", he stressed. "Only then were questions asked of Lambeth and other Local Authorities, to ascertain their legal requirement to undertake fire risk assessment".

He questioned if Lakanal House was a one off, or if it was symptomatic of a much more deeply rooted problem. He also queried if other issues were contributing to a picture of worsening public fire protection in the UK and pointed to the recent Association of British Insurers (ABI) fire loss figures. They show fire damage up by some 16% to £1.3b, which represents a record high. Life loss figures also indicate that we will see a significant rise over the next year. "Such a combination of factors should at least raise the question of, why", he stressed.

"Disasters such as Lakanal House could be minimised by much tighter Building Regulations" he claimed. "However, it is arguably just as true to state that if appropriate fire protection measures were installed correctly, in accordance with the Building Regulations, both the human and financial cost would be considerably lessened. "The demise of the Clerk of Works is symptomatic of how, piece by piece, our systems for delivering excellence of works in buildings have been stripped away and the matter has been made worse through the introduction of competitive bidding between local authorities and approved inspector bodies" he maintained.

Mr. Robinson confirmed that if the evidence of malpractice or inadequate passive fire protection witnessed by many ASFP members on an almost daily basis was anything to go by, the courts should be overflowing. The journey from the architect's initial design, to occupancy, is one loaded with opportunity for error, compounded upon error. The ASFP President drew the analogy of taking delivery of a new car. "Do you give much thought to the process of manufacture, or how the vehicle was inspected before delivery? You assume they put brakes in it, that the steering wheel is connected correctly and that your family will be safe in it. If you think that way about a car, why shouldn't the same rules apply to the fire protection measures installed in a building? The hazards are the same. Get it wrong and you run the risk of killing, or seriously injuring its occupants.

"It is simply not good enough to state that measures exist to ensure against incompetent workmanship, that everyone will take ownership of their responsibilities, utilise properly qualified people and proper independent audits". A full copy of Brian Robinson's speech can be found at: www.asfp.org.co.uk IFP

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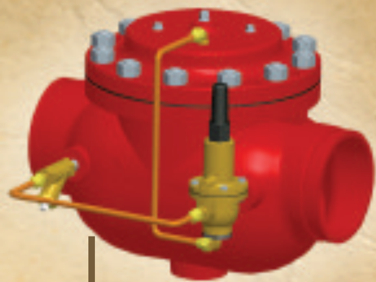

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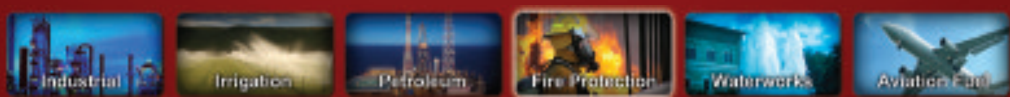

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THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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Collins to join MDM Publishing Ltd as Group Editor

Well known industry figure Graham Collins will join MDM Publishing Ltd as Group Editor, starting in June 2010. He will take direct responsibility for all editorial matters involving MDM's three leading trade magazines, International Fire Protection, International Fire Fighter and Asia Pacific Fire. When asked to comment on the appointment Collins said "I am thrilled to be joining such an exciting and dynamic organisation as the Group Editor. MDM Publishing Ltd has established its titles as the leading business to business international journals available to fire professionals around the world. I am looking forward to shaping new editorial features and exciting new content in the coming months within all three journals".

Graham has worked and lived in the USA, Middle East, France, Germany and Japan and brings over 15 years experience in the international fire industry, particularly fire suppression, foam concentrates and hardware, detection and alarm systems and emergency response. He has been a regular contributor in fire safety and construction industry magazines including the MDM Publishing Ltd titles. He has also worked as a specialist campaigns director for a fire industry PR company for the past 20 years. Graham is married and lists photography as one of his major interests.

Latest Industrial Flame Detectors from Spectrex

SharpEye 40/40 Series Flame Detectors offer unmatched performance and reliability – including patented, IR3 (Triple IR) Multi-Spectrum detectors that enable detection of small fires at distances up to 60m, with enhanced immunity to false alarms.

These highly specified detectors operate reliably in the harsh conditions of offshore drilling and production platforms, FPSO vessels, fuel loading and storage facilities, LNG and LPG plants and petrochemical plants throughout the world.

The latest SharpEye 40/40 Series flame detectors include the model 40/40I using the well-proven IR3 detector, offering the highest immunity to false alarms combined with a massive 65m (215ft) detection distance for hydrocarbon fires with an enlarged cone of vision – 100° horizontal and 95° vertical.

Fig 1 Ed – 40/40I detector

Another major feature is the improved response to gas flames (methane, LNG, LPG etc) where small gas flames can be detected at distances of up to 30m (100ft). An important addition to the series is the model 40/40M Multi IR detector, which can simultaneously detect 'invisible' hydrogen flames at 30m (100ft) *and* hydrocarbon fires at 65m (215ft).

The 40/40 series comprises many detection techniques to suit every situation including triple IR (IR3), Multi IR, combined UV/IR, single IR or UV. Thus, Spectrex can offer unbiased advice on which detector is the correct solution to your detection needs.

The compact and lightweight design (only 2.5kg in stainless steel) offers low-power consumption with a heated lens for continued availability in difficult environments – as well as the reassurance of 3rd party EN54-10 /FM performance approvals and IEC 61508 – SIL2 (TUV) certification to assure reliability. All detectors are, of course, Ex approved to ATEX/IECEx/FM/CSA/GOST R/GOST K standards for Zone 1/21 hazardous area location.

The 40/40 Series detectors incorporate an integral automatic self test which checks the devices every 15 mins to ensure correct operation. The 40/40 Series offers many interface options to ensure that the detectors are compatible with all control and fire detection systems – outputs include 0-20mA, dry relay contacts, RS-485 ModBus and HART.

The certified operating temperature range has also been extended. The detectors will now operate reliably in temperatures from –55ºC to +75ºC (with an option for +85ºC) allowing their use anywhere in the world.

The 40/40 Series detectors are programmable allowing the user alter factory default settings. Sensitivity levels, response time, alarm delay, heated lens operation etc are all able to be modified where required, either pre-delivery or after installation.

Fig 2 Ed – Flame Simulator with collimator

Various accessories are provided including a Flame Simulator to allow full 'end-to-end' proof testing in the Ex hazardous area.

SafEye Open Path Gas Detection for Combustible Gas Hazards

Spectrex's SafEye 'Line-of-Sight' IR Hydrocarbon Gas Detectors feature unprecedented reliability and exceptional detection capability for flammable hydrocarbon gases/vapours in a wide range of hazardous conditions and ambient environments

SafEye Open Path Hydrocarbon Gas Detectors, Series 700 and 200, monitor for combustible hydrocarbon gases over an open air 'path' of up to 460ft (140m) and can provide alarms prior to a fire or explosion event. The normal unit of measure for open-path detectors is the product of distance x concentration. Typical full scale is 0 – 5 LEL.meters. Unit of measure is LEL.meters i.e. 1 LEL.meter = 100%LEL over 1 metre (or 25%LEL over 4 meters etc).

The 'flash' type radiation source ensures immunity to any false alarms and the unit functions effectively even in extreme environments, such as fog, rain, smog etc. Heated optics are also available to ensure continued detection in extremes of weather. If the 'open-path' is ever *completely* blocked due to environmental or human intervention, a warning signal will be generated to allow corrective action or investigation.

Alignment is a simple one-man operation using a telescope – no electronic hand held device needed or connecting cables between source and detector units. The wide alignment tolerance ensures that SafEye.

SafEye detectors are fully Exd approved to ATEX and UL standards with a full range of interfaces including mA analogue, RS485 and HART. A SIL2 version is also available. IFP

Steelguard FM 550

Ferrari World – YAS Island Complex – Abu Dhabi – United Arab Emirates

PPG Protective & Marine Coatings is a world leader in the development and supply of performance coatings to protect steel and concrete structures from fire and corrosion around the world.

We work closely with the world's leading architects and engineers to enhance the use and appearance of our fire protection products across many industries: construction, petrochemical, chemical processing and also for railway and road tunnels.

Passive fire protection with thin-film intumescent coatings

A 'thin-film' intumescent coating is the passive fire protection method that enhances the visual appearance of a structure and will even add to the design with decorative finish and colour. This allows architects to show the steel construction while at the same time protecting its structural integrity in case of fire, allowing for safe evacuation and enhancing the access time required for rescue workers.

Thin-film intumescent coatings are commonly used on steel frame structures in airports, stadia, commercial, leisure, education, retail, manufacturing and industrial sectors. Intumescent coatings for the protection of steel from cellulosic fires are normally one-pack products – also known as thin-film intumescents. Their application is similar to painting by airless spray and results in extremely smooth surfaces.

Structural steel members painted with fire-protection intumescent coatings preserve their appearance. This is of major importance in modern architecture as the steel columns and beams are often visible and meant as a design feature in buildings, such as airports, hotels and sports stadia. To prove they are 'fit for purpose', intumescent coatings have to undergo a demanding fire test regime. Fire tests on several types and sizes of steel columns and beams are conducted using standardised conditions by accredited test facilities. In these tests the intumescent coating system has to prove its ability to keep the temperature of a steel section under a certain level – this being the critical temperature for a given time period, such as 30, 60, 90 or 120 minutes. Raw data tables from this test will identify the appropriate film thicknesses that should be applied on each type and size of steel section to provide protection for the required period. In many cases these assessments have to be finally verified and certified by an independent party, often a state authority.

PPG offers, under the trade name **Steelguard**, a complete range of intumescent coating systems for various grades of fire protection, climatic exposure conditions and application techniques while complying with many national standards.

Fire Engineering Service

Large projects frequently require additional fire engineering in which the coatings supplier, designer and contractor develop solutions for specific project applications and construction solutions to meet all fire protection requirements. With an experienced coatings supplier like PPG Protective & Marine Coatings, equipped with the latest laboratory facilities for formulating and fire testing, custom-made solutions can be developed to ensure dependable and compliant fire protection. IFP

Ferrari World YAS Island – Case study

PPG Protective & Marine Coatings in the Middle East was awarded the supply of the cellulosic intumescent fire protection system for the Coaster Bridge Buildings on the prestigious **Ferrari World – YAS Island** complex incorporating the Abu Dhabi Grand Prix Circuit. The inaugural Grand Prix was held in November 2009.

Ferrari World Abu Dhabi is the world's largest indoor theme park, sitting under a roof designed in the style of a classic double-curve body shell of a Ferrari GT car. There is energy, excitement and passion for the entire family at Ferrari World Abu Dhabi. With over 20 rides and attractions, including the world's fastest rollercoaster, Ferrari World is more than a theme park – it is where Ferrari's legendary story is unveiled.

Steelguard FM 550 was supplied for this project, protecting about 15,000 square meters of steel structures, protected against a 60-minute cellulosic fire. The constant professional perserverence by the PPG team resulted in the client selecting PPG Protective & Marine Coatings not only as the preferred manufacturer and supplier of the passive fire protection system, but also to ensure that the fast track project would be completed by November 2009. In addition, the contactor for this project made product comparisons indicating that Steelguard FM 550 had the most favourable application and drying features. A polyurethane topcoat was used as a decorative and durable finish.

This project represented a key strategic milestone in the drive to establish the PPG Steelguard range as the leading cellulosic fire protection product in the Middle East.

For more information please contact:
PPG Industries (UK) Limited
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2010 NFPA Confer

Mark your calendars and plan to attend the most important event for the fire, life safety and electrical industry. Join NFPA and other likeminded professionals as we gather on June 7-10, 2010 for the *2010 NFPA Conference & Expo* – widely regarded as the most comprehensive event in the industry. The event combines an unrivaled educational conference and an exhibition with more than 300 exhibiting companies. You'll want to take advantage of the networking opportunities and gain up-to-date knowledge on codes and standards that relate to you.

The Education Conference

The education conference includes an impressive list of industry experts. Presentations will included many case studies, code updates and results from a myriad of research projects. On Tuesday June 8, the featured presentation will be given by the newly appointed, Administrator for the Federal Emergency Management Agency's United States Fire Administration, Kevin Cochran. The presentation – "*Putting the Fire Back in the U.S. Fire Administration: Shaping the Future"* – will certainly be a huge attraction during the event. Kevin has over twenty-five years of experience in preventing and responding to fires and emergencies and extensive experience in the fire service including fire fighting, emergency medical services, hazardous materials response, public education and research and development.

The entertainment during the general session is an annual highlight. This year the general session will feature Gerry McCambridge, better known as "The Mentalist". Gerry has been amazing audiences for over 30 years and has headlined many shows and appeared on countless radio and TV talk show including, "Late Night with David Letterman," and "The Today Show" . McCambridge is also the crator and executive producer of the hit prime-time television show "The Mentalist".

The conference schedule offers more than 130 education sessions within 11 conference tracks. The Society of Fire Protection Engineers is pleased to once again sponsor the **Fire Protection Engineering Track** which will focus on the advancement and education of fire protection engineering. Rounding out the conference tracks are:

- **Building and Life Safety** – This track concentrates on practical information needed by designers, engineers, and building and fire officials, such as plans review, inspection techniques, and updates on code requirements, new technologies, and best practices.
- **Codes and Standards** – This track focuses on providing information to assist with code application. Includes many sessions which discuss important code updates and changes.
- **Detection and Suppression** – This track concentrates on code requirements and design issues, the application of new technologies in alarm and suppression systems, and the impact of maintenance on systems performance.
- **Emergency Preparedness/Business Continuity** – This includes information on assessing risks and consequences, emergency preparedness, contingency planning, incident management, and recovery plans.
- **Fire and Emergency Services** – This track features current information on fire-fighting apparatus and technologies, safety and

ence & Expo

preparedness for first responders, incident command strategies, and fire prevention and inspection techniques.

- **Facility Fire Safety and Security** – Features of this track will emphasize new technology in industrial fire protection and emergency response, fuel storage issues, and security of industrial processes.
- **Electrical** – This considers new electrical design issues, successful maintenance programs, and best practices in electrical contracting, effective inspection techniques, and practical electrical safety programs.
- **Loss Control/Prevention** – This track provides essential information on preventing property damage due to threats posed by fire and other hazards. Help protect your organization and better understand how various hazards can affect your day-to-day operations.
- **Public Education** – This track includes fire and life safety planning and strategies. Also offers the latest in safety education including challenges and creative solutions.
- **Research** – The research track considers the latest information available on many timely issues, such as video smoke and flame detection systems and reliability of water mist fire protection systems.
- **NEW! Green** – This in-demand track includes session with a focus on environmentally friendly initiatives that affect the design, maintenance and testing for fire and life safety systems and components.

The Expo

The three-day expo will showcase many of the latest technologies and services from more than 300 of the top solution providers in the fire and life safety, and electrical industries. Knowledgeable representatives from these companies will be available to answer your questions and offer solutions to your most pressing challenges. The exposition provides attendees the ideal location to see, touch and try products as well as meet with a company's technical staff. As always, the expo is free when you register in advance.

Pre-Conference Seminars

While the *2010 NFPA Conference & Expo* officially begins on June 7th, you can arrive early to attend any of the 19 comprehensive pre-conference seminars being offered. Some of these seminars will only be offered in Las Vegas. Pre-conference seminars are priced separately from the main conference and are offered at a substantial discount from NFPA's regular seminar pricing. Why not come early and enrich your overall experience? The seminars include:

Five 1-Day Seminars on Saturday

- NFPA 3, Standard on Commissioning and Integrated Testing of Fire Protection and Life Safety Systems
- Changes to NFPA 13, 2010 Edition
- Designing and Installing Photovoltaic Systems
- Risk Management/Property Loss
- Water Mist Fire Protection Systems

Seven 2-Day Seminars on Saturday & Sunday

- CFPS Primer
- NFPA 1, Fire Code
- NFPA 1600, Disaster/Emergency Management and Business Continuity Programs
- NFPA 921, Fire and Explosion Investigations
- Code Requirements for Maintaining Fire & Life Safety Systems
- NFPA 72®, Alarmas y Deteccion (en español)
- NFPA 70E®, Electrical Safety in the Workplace®

Three 3-Day Seminars on Saturday – Monday
- NFPA 13, Installation of Sprinkler Systems
- NFPA 72, National Fire Alarm & Signaling Code
- NFPA 101, Life Safety Code Essentials

Four 1-Day Seminars on Sunday
- IAEI's Analysis of Changes – 2011 (NEC)
- Dust Explosion Hazards
- Changes to NFPA 72, 2010 Edition
- Aviation Fire Safety

NFPA Conference & Expo Blog
Stay on top of all the important details regarding the NFPA Conference & Expo by visiting the blog site! To view the NFPA Conference & Expo blog site, go to: http://npfa.typepad.com/conference. Visitors to the site will find updated articles, live broadcasts and downloadable podcasts. Give feedback before, during, and after the conference regarding your experience on the conference blog.

NEW! Social Media
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NEW! NFPA Mobile Application
We are excited to introduce NFPA's new mobile application **NFPA C&E,** specifically designed for the *2010 NFPA Conference & Expo*. Virtually all smartphone users (Blackberry, iPhone, Android, Palm OS, Symbian, Java, Windows Mobile, etc.) have free access to the application. Access all the information you need to make the most of your conference experience in the palm of your hand. To download **NFPA C&E**, you may go to the iTunes App Store, Android Market or Blackberry App World and search for **NFPA C&E.** If you are on any other mobile phone, you may download the application directly from your mobile browser by going to **nfpa.boopsie.com**. You will be prompted to download the application for your particular phone, or you may use the 'web lite' version of the application from your browser.

The Association Technical Meeting
At the heart of the codes and standards development process is the Association Technical Meeting. More than 30 documents are up for review this June including NFPA 70, National Electrical Code, NFPA 25, Standard for the Inspection, Testing and Maintenance of Water-Based Fire Protection Systems and NFPA 654, Standard for the Prevention of Fire and Dust Explosions. Documents that cover flammable and combustible liquids, aircraft hangars, Class A foams, liquefied petroleum gas, explosive materials, laboratories using chemicals, and fire protection for marinas and boatyards and more will be voted on during these sessions. **Technical Committee (TC) members will receive 20% off conference registration prices.**

Las Vegas
Did you know that Las Vegas offers much more than casinos and bright lights? When you travel to Las Vegas, you enter a world that will captivate you by its international flare, superb dining choices, and award-winning shows. You are sure to be impressed by the unique building structures, massive hotels and the countless attractions, sights and sounds of this destination city – especially the brand new $11 billion City Center. Depending on where you are traveling from, flights to Las Vegas are relatively inexpensive, couple that with endless dining options and reasonable hotel rates, and you have a perfect destination for any company budget. Come to the *2010 Conference & Expo* for an incomparable learning experience and be sure to explore all that Las Vegas has to offer.

Hotel Reservations/Registration
NPFA has negotiated special rates at four Las Vegas hotels close to the Mandalay Bay Convention Center and easily accessible by tram: Mandalay Bay Hotel, THEhotel at Mandalay Bay, Luxor and Excalibur. Hotel reservations can be made online at www.nfpa.org/conference or by calling the Las Vegas Hotel Housing Authority toll free (US) at 1-888-892-5822. Don't delay! Register now! IFP

nfpa CONFERENCE & EXPO

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LEIPZIG 7 – 12 JUNE 2010

Interschutz, the world's largest trade exhibition aimed at the fire industry will soon be upon us. Held once every 5 years, anyone and anybody involved in the fire safety and fire fighting industry will be in Leipzig, Germany between the 7th and 12th June 2010 attending this prestigious event. IFF takes a look at some essential information for visitors as well as exhibitors attending Interschutz.

VISITOR INFORMATION

INTERSCHUTZ 2010, 7 to 12 June

At a glance

Duration:
Monday, 7 June to Saturday, 12 June 2010

Opening hours:
Daily from 9.00 a.m. to 6.00 p.m.

Admission prices:

Advance sales and Ticket office

Single admission	18.00 EUR
Full-event ticket	41.00 EUR

Student's day ticket (incl. young people in military or civilian service: ID required)
11.00 EUR

Tickets can be bought in advance via the Internet (www.interschutz.de)

Free ride to and from event
Your admission ticket entitles you to ride public transit free of charge* on the day of the event on all lines operated by the MDV transit authority (Mitteldeutscher Verkehrsverbund), valid for the following regions and fare zones:

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Nordsachsen County
Mittelsachsen County
Burgen County
Halle
Saale County
Altenburger Land

Catalogue:
€17 plus postage and packaging (available approx. 3 weeks before opening day of event)
Internet: http://www.interschutz.de/catalogue

Visitor information:
Internet: http://www.interschutz/visitorservice
Email: interschutz@messe.de

Getting there:
If traveling by car, simply follow the signs to the exhibition center (*Messegelände*) in and around Leipzig; the Leipzig exhibition center is well signposted. Our dynamic parking guidance system will point you to the nearest parking space.

If traveling to Leipzig by train, you can reach the exhibition center (*Messegelände*) from Leipzig Central Railway Station (*Hauptbahnhof*) by taking the regional train, the FlughafenExpress train, the tram or a taxi. For more information, please inquire at the Service Point desk at Central Railway Station.

Numerous airlines serve the Leipzig/Halle Airport. There are over 300 direct flights to and from eight German cities and 72 cities abroad. Leipzig/Halle Airport also gives you easy access to the following major international airport hubs: Frankfurt, Munich, Paris and Vienna.

Travel and accommodations:
Do you prefer a quiet's night sleep, or would you rather be close to Leipzig's pulsating nightlife? The Leipziger Messe company can provide you with recommendations and reservations for any location or price category. Your selection of accommodations ranges from hotels, pensions and guesthouses with a total of 12,000 beds between them – from "shoestring budget" to luxury. For more information, visit www.interschutz.de/61050.

Parking:
The press parking lot for journalists at Leipziger Messe is located inside the exhibition grounds next to the Messehaus building. The parking lot is accessible via Messe-Allee, South 1 gate.

Range of exhibits:
Vehicles and vehicle equipment, fire extinguishing appliances and systems, fire extinguishing agents, technical support and environmental protection, rescue, emergency, first-aid and medical equipment, personal protective equipment, measuring and detection apparatus, control-station and signaling technology, information and organization, equipment for fire stations and workshops, building and construction industry, structural and organizational fire protection, associations, organizations, service companies, technical literature, model making, fan articles, gifts,

Exhibitors:
The organizers anticipate some 1,100 exhibiting enterprises, occupying more than 80,000 m^2 of net display space.

Press Center:
At the Messehaus building, open from Sunday, 5 June 2009, starting at 9:00 a.m.

CHEMGUARD

CHEMGUARD
FIRE SUPPRESSION SOLUTIONS

HALL 3, STAND C76, BOOTH NO. C4

Chemguard Leads with Innovative Products, Comprehensive Support

Chemguard is a full-service ISO 9001:2008 certified manufacturer of UL and FM approved fire suppression foams, equipment, and systems.

Chemguard's Fire Suppression Division has been researching, developing, formulating, and distributing high-quality, dependable fire-fighting foam concentrates for more than two decades. Our efficient and environmentally friendly UL Listed/FM Approved foam products are used worldwide. Chemguard performs topside and sprinkler fire tests for a wide variety of test standards at our onsite Fire Test Facility. We have obtained international approvals for Chemguard foam concentrates, including IMO, DNV, LASTFIRE, and EN 1568.

Chemguard designs and manufactures an extensive line of fire-fighting foam hardware, including nozzles, monitors, and foam trailers. We also offer on-site product fabrication, including ASME bladder tank and custom foam skid fabrication. Our intensive quality control procedures ensure that equipment shipped from Chemguard reflects our reputation for excellence and is delivered on-time at competitive prices.

Chemguard's systems engineers provide fire suppression systems design and applications assistance – reviewing specifications, providing value-added engineering alternatives, and supporting systems start-up. Working side by side with customers, we apply our years of experience designing systems for petrochemical facilities, hangars, flammable-liquid storage tanks, warehouses, and other challenging installations to maximize performance, efficiency, and effectiveness.

The Chemguard Specialty Pumps Division manufactures a complete line of UL Listed/FM Approved positive-displacement foam concentrate pumps for fire-protection systems. Based on a proven design with several unique features, these durable pumps are built for years of dependable operation.

Chemguard's research-based Specialty Chemicals Division produces a rapidly expanding selection of fluorosurfactant and hydrocarbon surfactant specialty chemical products for formulating all types of fire-fighting foam products.

Known around the world, Chemguard is recognized for comprehensive customer support, high-quality and field-tested products, and the ability to meet customer requirements through product customization.

Contact details:
Vice President of Sales and Marketing
John Vieweger
jvieweger@chemguard.com

DESU

DESU

HALL 3, STAND NO. F19

Having been in business since early 2005 successfully, Desu Systems BV – Special Hazard Fire Detection & Suppression – continues to strengthen its position in the EMEA market being specialist in Flame-, Gas- and Spark detection as well as Low Pressure CO2 and kitchen fire suppression systems.

During the Interschutz 2010 on the detection side of its business, the company is pleased to introduce its brand new line of 40/40 Flame Detectors ranging from UV and IR to UV/IR, IR3 and Multispectrum flame detectors, all CE marked, EN-54-10, ATEX EExde, SIL2, DNV, GOST-R and CPD approved and standard equipped with heated window optics.

On the suppression side of its business, the company is pleased to introduce its UL-300, NFPA17A, NFPA96 approved and CE marked Kitchen Mister kitchen fire suppression system for which it obtained the distribution rights in EMEA from Buckeye Fire Equipment.

For enquiries please contact Ronald Verkroost, rverkroost@desusystems.com or visit www.desusystems.com and come and see us in Hall 3, F19.

DR STHAMER

Dr. STHAMER HAMBURG

HALL 5, BOOTH G74

Dr Sthamer – Hamburg, one Germany's oldest companies and Europe's leader in Fire Fighting Foam Concentrate Technology, will be displaying their latest developments in fire fighting foams and how they should be used utilizing several interactive displays.

Dr Sthamer has the full range of Fire Fighting Foams to protect you assets, including the latest generation of Fluorine Free Alcohol Resistant Foams.

Please visit us to discuss your needs and requirements for Industrial, Municipal, Aircraft Rescue, Marine or Wildfire Fire Fighting Foams.

Contact details:
DR. STHAMER – HAMBURG Liebigstrasse 5, D22113 Hamburg, Germany
Tel: +49 40 736168-0
Fax: +49 40736168-60
Website: www.sthamer.com
Cell +44 7795 101770 •
jknappert@sthamer.com


BAVARIA®

DUPONT

HALL 001, STAND H10

DuPont has been a leader in fire protection and a driving force in the development of safe, clean alternatives to commonly used fire suppression systems. We pioneered much of the science that makes clean agent fire extinguishants possible. Through the Science of Protection™, we are committed to protecting what matters most.

DuPont™ FM-200® is accepted and respected worldwide, with a history of protecting some of the world's most critical and irreplaceable assets. In fact, FM-200® is in use in over one hundred thousand applications, in more than 70 nations.

Many fire suppression systems can cause major damage to – and even destroy – the very things they are supposed to protect. FM-200® fire suppressant stops fires fast. When you consider the potentially devastating environmental effects of an uncontrolled fire, it's easy to see that an FM-200® system is an important part of an environmentally responsible fire suppression solution.

FM-200® systems reach extinguishing levels in 10 seconds or less, stopping ordinary combustible, electrical, and flammable liquid fires before they cause significant damage. That's the fastest fire protection available, period. When fire is extinguished this quickly, it means less damage, lower repair costs, and an extra margin of safety for people. It also means less downtime and disruption of business.

FM-200® fire suppressant can be safely used where people are present.

In applications where space is at a premium, FM-200® fire suppression systems are the superior choice. The FM-200® agent is stored in cylinders as a liquid and pressurized with nitrogen, saving huge amounts of storage space. FM-200® systems take up to seven times less storage space than systems based on CO2 and inert gases.

For more information, visit: www.cleanagents.dupont.com

FIRETRACE®

HALL 003, STAND B76

Firetrace® to showcase UL & FM Approved Fire Protection

Firetrace International will be showcasing its full range of FIRETRACE® automatic fire detection and suppression systems at Interschutz in Leipzig, the only UL [Underwriters Laboratories] listed, FM [Factory Mutual] approved and CE [Conformité Européene or European Conformity] marked tube-operated system in the world that is tested as an automatic fire detection and suppression system.

The ISO 9001:2008-certified company will also be highlighting a selection of the 150,000 successful FIRETRACE installations completed around the world. Today, these are protecting business-critical "micro-environments" such as electrical cabinets, machinery enclosures, fume hoods, engine compartments, wind turbines and a host of other applications in the mining, pharmaceutical, manufacturing, power generation, mass transit, telecommunication and petrochemical industries.

The tried-and-tested system is truly unique among tube-operated systems. In addition to its endorsement by UL and FM, and its CE marking that confirms its compliance with the essential requirements of the relevant European health, safety and environmental protection legislation, FIRETRACE has accreditations and approvals from more than 25 other world-renowned independent agencies. It also stands apart from its competitors by being able to be supplied with a variety of suppression agents, the choice of which is tailored to the precise fire risk.

Currently, the FIRETRACE suppression options include the latest environmentally-acceptable clean agents such as 3M™ Novec™ 1230 Fire Suppression Fluid and DuPont™ FM-200®, together with ABC dry chemical agents and AFFF foam. CO_2 [carbon dioxide] is another FIRETRACE extinguishant, although the company points out that extreme care has to be taken to ensure that it is not used in any applications where there is a risk of thermal shock to delicate electrical equipment.

Genuine FIRETRACE is available only via Firetrace International's global network of authorised distributors. These trading partners are skilled in hazard analysis, agent and system selection, installation, commissioning and support, and use only genuine FIRETRACE components. Details of these authorised distributors are available by contacting Firetrace International at info@firetrace.com.

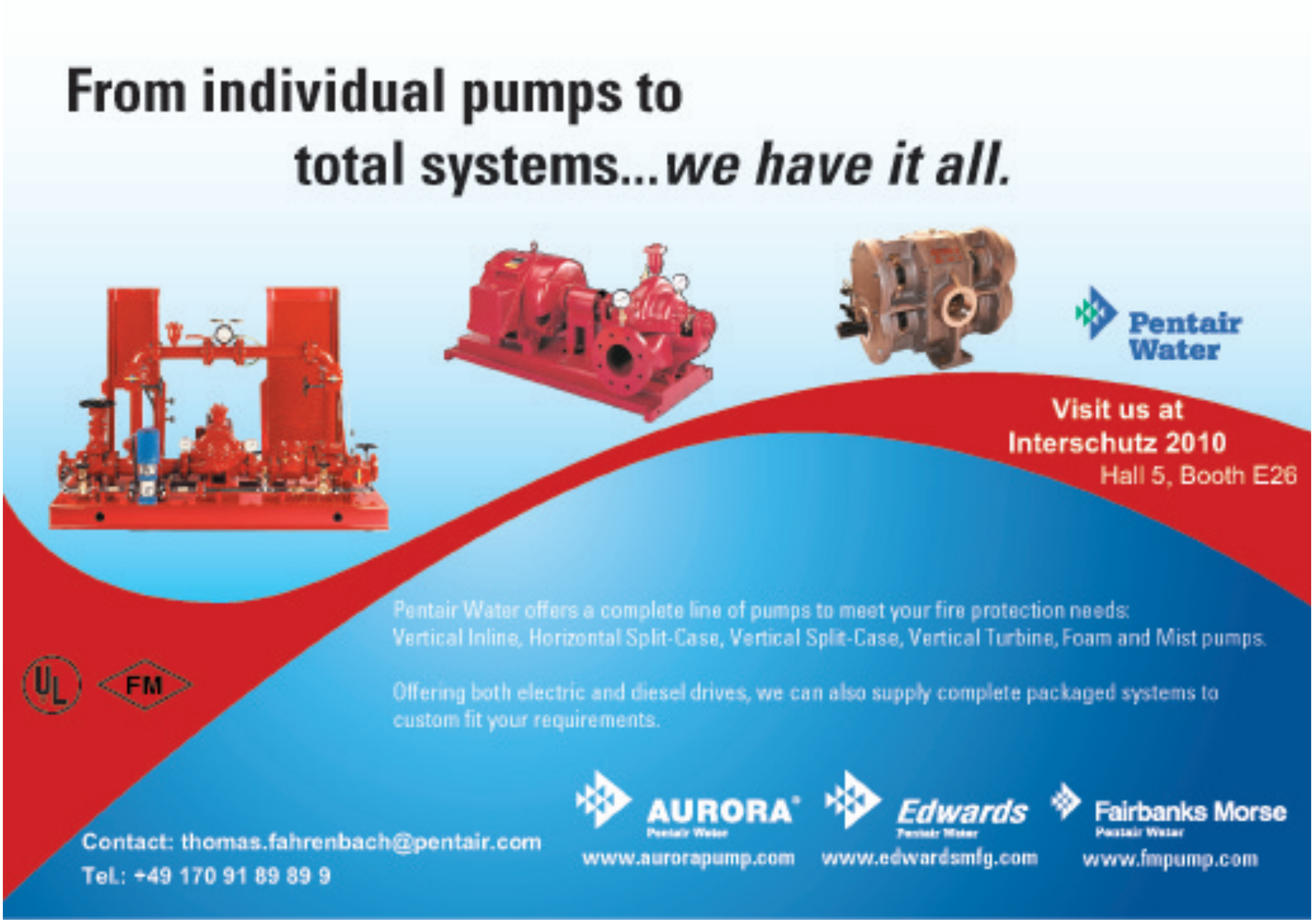
European, Middle Eastern and African operations for Firetrace International are managed from the company's EMEA administration, manufacturing and logistics facility near Gatwick in the UK.

Further information is available on +44 (0) 1293 780390, or from Firetrace International headquarters in Scottsdale, Arizona USA on +1 480 607 1218. The company's website is at www.firetrace.com

FOGTEC

HALL 5, STAND NO. D45

FOGTEC is the leading specialist for high-pressure water mist systems. FOGTEC systems use pure water, converting it to fine mist at a pressure around 100 bar. These systems are not only 100% eco-friendly but are often more effective than conventional gas or water fire fighting equipment. The high energy binding potential and the local inerting effect allows to reduce the required water amount to 10% of the one required by conventional systems.


From individual pumps to
total systems...we have it all.
Pentair Water
Visit us at
Interschutz 2010
Hall 5, Booth E26
Pentair Water offers a complete line of pumps to meet your fire protection needs:
Vertical Inline, Horizontal Split-Case, Vertical Split-Case, Vertical Turbine, Foam and Mist pumps.
Offering both electric and diesel drives, we can also supply complete packaged systems to
custom fit your requirements.
UL
FM
Contact: thomas.fahrenbach@pentair.com
Tel.: +49 170 91 89 89 9
AURORA
www.aurorapump.com
Edwards
www.edwardsmfg.com
Fairbanks Morse
www.fmpump.com


Products made for fire fighting in the
chemical and petro-chemical industry
Meet us at Interschutz Hall 5 - booth C46
AVK
AVK INTERNATIONAL A/S
Bizonvej 1, Skovby • 8464 Galten • Denmark
Tlf.: +45 87 54 21 00 • Fax: +45 87 54 21 20
www.avkvalves.com • sales@avk.dk

With 45 system partners FOGTEC globally offers its systems for applications like offices, hotels, museums, archives, industrial applications, ships, trains and tunnels. A team of specialised engineers are developing and designing the systems in the head office in Cologne, in Rostock and in the Asian offices in Mumbai and Shanghai.

In the field of tunnel protection FOGTEC is the market leader. Tunnels have been protected in Madrid, Moscow, Newcastle and along the Brenner motorway in Italy. FOGTEC has been awarded as part of a consortium the contract for the fire protection system in the Eurotunnel. After successful full scale fire tests with fire sizes up to 200 MW, an optimal protection concept including detection and fire fighting with water mist in four SAFE stations of each 900 m length along the two bores of the Eurotunnel is currently in the installation phase within the tunnel. The system localises a fire on the train wagons within the tunnel and reduces the heat release and temperatures to allow personnel to safely evacuate the trains and the fire brigade to carry out fire fighting measures.

For more details please visit us at our booth Hall 5 No. D45 on the Interschutz exhibition.

Further information:
FOGTEC Brandschutz GmbH & Co KG
Schanzenstrasse 19 A
51630 Köln
www.fogtec.com
contact@fogtec.com

GIELLE srl

GIELLE

HALL 001, STAND NO. D16

Gielle srl, the parent company of the Gielle Group, with more than 45 years of experience in the field of fire fighting, has become one of the leading European companies in the design and manufacture of automatic fire fighting systems.

Technological innovation, quality and internationalization are the strong points that have made Gielle one of the most qualified companies in this field.

This active and dynamic company supplies its systems all over the world and offers a level of professionalism to its clients that is unsurpassed. IS0 9001, ISO 14001, BS OHSAS 18001, SA 8000, ATEX 94/9/CE and PED 97/23/CE certifications of its integrated management system make an undisputed statement of Gielle's full potential.

In nearly half a century the Group has always considered flexibility one of its major strengths.

Gielle also has an advanced R&D division which is supported by its motivated engineering, technical sales, administration, production and marketing departments, all with a single goal in mind: customer satisfaction.

Our mission is to make the world a safer place. To do this, we develop and supply advanced fire fighting products and systems, supported by first class service. People and businesses everywhere trust our brands and depend on our expertise to protect what is most valuable.

Including fire detection, fire suppression and fire control products. Our products set the benchmark for fire safety detection, prevention and protection. We are devoted to protecting people, property and processes from everyday hazards and danger. People trust us to do that because we are experts in our field. And that trust is reinforced by the quality we instill in everything we do.

Our fire suppression products include: FM_200®, Argonite®, 3M™ Novec™ 1230 Fire Protection Fluid, FE-13™, WHDR wet chemical, IND dry chemical and a wide range of fire extinguishers.

We hope that our company can be included in your vendor list and You can request any quotations for any type of project.

BLAZEMASTER®

BlazeMaster®
FIRE SPRINKLER SYSTEMS

HALL 5, STAND NO. E13/1

It may be surprising to learn that the first fire sprinkler systems were not designed with any thought of protecting human life, but were installed almost exclusively for the protection of buildings and their contents! It was not until the middle of the last century, following several fires in the U.S. that resulted in large losses of life, that authorities realised the importance of providing life safety systems for building occupants.

A fire sprinkler system with proven performance in protecting lives and buildings worldwide is the BlazeMaster fire sprinkler system, utilising CPVC pipes and fittings.

CPVC stands for chlorinated polyvinylchloride and is a plastic material which was developed originally in the 1950s. BlazeMaster CPVC pipes and fittings are specially designed for use in fire sprinkler systems. BlazeMaster fire sprinkler systems have gained world wide recognition with over 300 million metres installed around the world since its introduction in 1984.

Today BlazeMaster fire sprinkler systems are used in a wide variety of residential and commercial applications such as high rise buildings, hotels, educational and healthcare facilities, and in domestic dwellings. BlazeMaster systems are increasing in popularity due to the following benefits:

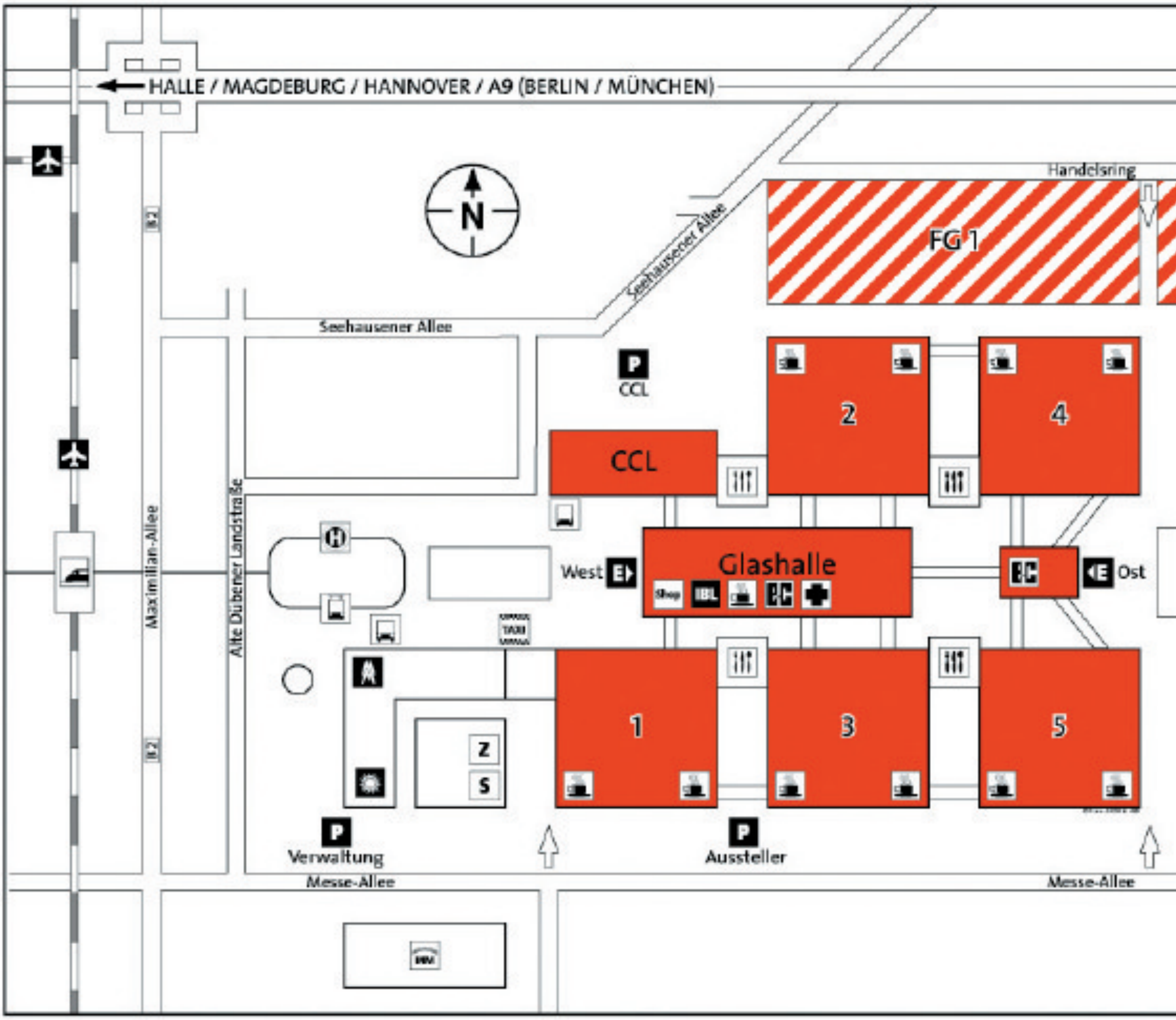
Durability and long service life: No corrosion!

Superior Hydraulics: Hazen Williams C-Factor of 150!

Fast Installations, Easy Handling: Fast jointing process! Easy transport and handling on jobsite!

Light Weight: One fitter can lift, carry and install the pipe work on his own, even for bigger diameters!

To learn more about BlazeMaster fire sprinkler systems, please visit us at our stand E13/1 – Hall 5 at the Interschutz in Leipzig, Germany or contact Sinikka Freidhof, Market Development Manager EMEAI, Lubrizol Advanced Materials Europe BVBA, Chaussée de Wavre 1945, B-1160 Brussels, Belgium, sinikka.freidhof@ lubrizol-be.com, Tel: +32 2 678 19 11



Display Categories INTERSCHUTZ 2010

Vehicles and vehicle equipment
Hall 1, 2, 4 + Open-air ground 1

Fire extinguishers appliances and systems, extinguishing agents
Hall 1, 5

Technical support and environmental protection
Hall 1, 2 + Open-air ground 1

Rescue, emergency, first-aid and medical equipment
Hall 1, 2, 3 + Open-air ground 1

Personal protective equipment
Hall 1 and 3

Measuring and detection apparatus
Hall 3

Control station and signaling technology
Hall 3

Information and organization technology
Hall 3

Equipment for fire stations and workshops
Hall 1, 5

Building and construction industry, structural and organisational fire protection
Hall 1, 5

Associations, organizations, services
Hall 1, 2, 3, 5

Trade literature, model making, gift items
Hall 1, 2, 4

Press Centre Entrance	Station Leipzig Messe
EC-Cash dispensing machine	Heliport
Business Lounge	First aid
Restaurant	Fair shop
Parking	Café
Airport-City-Shuffle	Police
Taxi	Customs
Tram line 16	Forwarding Agencies
Tram	MaxicoM
Bus Stop	(Euro-Asia Business Group)

The benefits of exhibiting at the show

The No.1 event in the industry calendar
With more than 120,000 visitors and over 1,200 exhibitors, INTERSCHUTZ is the leading international trade fair for public safety. Featuring the world's largest array of exhibits for disaster prevention, rescue and emergency services, INTERSCHUTZ offers you a fantastic opportunity to demonstrate the competence of your company and organization to the entire industry – with just one trade fair presentation.

Unique concept
Due to the combination of commercial and non-commercial exhibitors under the same roof you benefit as a supplier from directfeedback from the users of your security solutions. This puts you in an excellent position to fine-tune your product range to meet changing market needs.

Efficient business platform
With over 90% of visitors classed as trade visitors, you can be certain of reaching large numbers of decision-makers and buyers. This makes INTERSCHUTZ an ideal platform for successful new product launches and business deals.

International audience
At INTERSCHUTZ you'll meet top decision-makers from all over the world. This gives you ready access to profitable new markets.

Barometer of trends
Learn about pioneering innovations and key trends within the industry at the conferences, symposia and corporate lectures that accompany the show. You'll benefit from the professional expertise of leading experts and gather useful information for shaping the future course of your company and organization.

Attention guaranteed
An extensive advertising campaign and an attractive program of events serve to generate and maintain the interest of visitors and the media.

Excellent facilities
The modern exhibition complex in Leipzig with its fascinating steel and glass architecture provides you with everything you need in terms of both organization and technical facilities.

Reasonably priced entry
For as little as Euro 5,321 (plus VAT) you can book a 20 m^2 fair-package system stand, fully fitted and ready to go – and enjoy all the benefits of exhibiting at INTERSCHUTZ.

MINIMAX

HALL 5, BVFA STAND NO. F78
HALL 1, VBBD STAND NO. H38

At INTERSCHUTZ, Minimax, a firm world leader in fire protection, presents new visual product highlights of mobile fire protection: design fire extinguishers and wall hydrants. In addition to this, innovative developments for smoke and heat exhaust venting systems will be unveiled. Concerning system operation, visitors at INTERSCHUTZ will be introduced to the 'Smart Systems' compact systems with easy assembly.

Functional safety, durability and the best 'Made in Germany' quality – Minimax Mobile Services has developed its new generation of fire extinguishers based on this pledge. As a fire extinguisher producer with the highest rate of vertical integration, we use complex quality control procedures to guarantee standards at every production stage.

The Minimax design extinguishers not only ensure safety, but also add stylish design touches. Thanks to the four new versions – the refined *Edition Line*, the *Logo Line*, the unique *Individual Line* and the exclusive Luxury Line – you can now let your creativity run free.

The design wall hydrants in the Minimax Prestige Line & Future are also guaranteed to be the stylish centre of attention. This individual combination of reliable protection and style is currently only offered by Minimax Mobile Services – the company has received exclusivity rights for distribution in Germany.

The smoke and heat exhaust venting stairwell system provides effective smoke ventilation in the event of a fire, thus ensuring vital smoke-free escape and rescue routes. Reliable smoke removal from lift shafts in accordance with the valid EnEV law is guaranteed by the new lift shaft smoke extraction system (LiSE), which will be unveiled for the first time at INTERSCHUTZ.

The product portfolio offered by the new Minimax sales branch, Smart Systems Sales, consists of pre-assembled fire protection systems with easy installation. Examples of this are the active extinguishing system OneU and the MX 1230 or MX 200 compact extinguishing systems. The Smart Systems can be used almost anywhere where compact systems optimally meet fire protection requirements and can be installed without complex assembly procedures.

Unified, structured and effective – this is the motto of the new operations control for the ELSA field staff service, which ensures that capacities are used optimally and effectively, whilst also greatly reducing reaction times for emergency services.

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Business Unit Technologies
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Fax: +49 4531 803-500
Email: LoddochA@minimax.de
www.minimax.de

MSA

HALL 3, STAND NO. A74

MSA has once again redefined the high performance multi-gas detector with the new ALTAIR 5. Capable of measuring up to six gases simultaneously, the ALTAIR 5 can be fitted with a wide range of both toxic and infra-red sensors, providing the flexibility required to meet most applications. There is even the option to have a diffusion instrument or one with a built-in pump.

The multifunctional alarms, MotionAlert and InstantAlert, are standard on the ALTAIR 5. When enabled, the MotionAlert with motion detector alerts anyone in the vicinity if the user is in distress with audible and visual alarms. The user can also alert anyone nearby with a 3 second button press, activating the InstantAlert alarm. The ALTAIR 5 comes with the proven high performance triple alarm system, 24 hour bump test checkmark and comprehensive data-logging facility as standard.

On top of this ALTAIR 5 can offer the Wireless USB option that allows the integration into the alpha Personal Network. This monitoring and alarm system consists of modular and wireless components. These can be individually integrated to enable those wearing breathing apparatus and portable gas detection equipment to be easily monitored by sending information to a central control station. Gas readings and alarms can now be transmitted and displayed in real time.

Gas concentrations and other data can be seen at a glance via the full graphical monochrome display or the optional high resolution colour display which provides simple yet comprehensive information instantly and can be customised with a company logo.

The rechargeable battery provides up to 15 hours of continuous operation from a charge time of up to six hours. With reliability a key factor, ALTAIR 5 has an extremely durable rubberized housing for water and dust ingress protection (IP 65). An intuitive three button operation ensures the ALTAIR 5 is extremely easy to use even when wearing gloves and the 18 pre-programmed

languages further enhance its user acceptance all over the world.

The GALAXY is the ALTAIR 5's perfect companion providing automated record keeping, calibration, testing and charging system.

The versatile ALTAIR 5 can be configured for individual requirements to suit a myriad of applications in and beyond the following industries: oil and gas, chemicals, steel and iron, utilities, fire service, waste water, civil engineering and contractors.

For further information please contact your local MSA representative or check our website www.msa-europe.com.

NFPA

HALL 3, STAND NO. B76

NFPA is an international, private, nonprofit membership organization founded in 1896 as the National Fire Protection Association. Today, with more than 81,000 members representing nearly 100 nations and 320 employees around the world, NFPA serves as the world's leading advocate of fire prevention and is an authoritative source on public safety. In fact, NFPA's 300 codes and standards influence every building, process, service, design, and installation in the United States, as well as many of those used in other countries.

NFPA codes and standards have helped save lives and protect property around the world. The volunteers and staff of NFPA are dedicated to the single mission of continually enhancing public safety. That dedication can be seen in the codes and standards that are adopted – documents developed through NFPA's commitment to creating a true consensus among those interested in safety.

NFPA's mission to save lives and property from fire and other hazards isn't limited by national boundaries. Over the past decade, NFPA has transformed itself from a national organization with international influence to a truly international organization. We have established offices in Canada, Mexico, France and China, and many of our codes have been translated into Spanish, French, Portuguese, Chinese and Korean. We've established collaborative relationships with our counterparts around the world, and not a week passes that we don't get visitors from other countries. We also conduct seminars worldwide and host hundreds of international visitors during our annual member meeting NFPA's Congress and Exposition.

Further information:
One Batterymarch Park
Quincy, MA 02169
Tel: +1-617-770-3000
www.nfpa.org

SOLBERG

HALL 5, STAND NO. F29

Solberg Scandinavian "The Foam Experts" are renowned for their forward thinking and active Research and Development program. They pride themselves on being at the forefront of new, state-of-the-art technology and indeed are proud to be able to offer our customers the very latest in PFC free Foams.

We are now pleased to be able to add two new innovative products.

Customers have told us that there is a need for a multi-purpose foam for use on both Class \A' and Class \B' fires. Solberg Scandinavian's R&D team got to work and has developed an addition to its PFC Free foam range, which we have called 'Re-Healing Foam MB'.

The benefits and characteristics of this new foam is that it can be used at 0.5% on Class \A' fires, and 3% on Class \B' hydrocarbon fires, including Bio-Fuels from E5 right up to E85. This pseudoplastic foam concentrate can be used with most of the existing proportioning systems and it can be used at low, medium or high expansion (800:1). A further benefit to this new product is its ability to adhere to vertical surfaces creating a thermal barrier from radiated heat and allowing constant cooling as water ebbs from the foam bubble structure. This new feature gives fire fighters the opportunity to seal surrounding risks while they extinguish the main fire.

Sealing and controlling ammonia spills is extremely difficult due to the constant boiling of the ammonia at ambient temperatures destroying a conventional foam blanket. It requires a new product to secure and prevent any further escalation. Solberg Scandinavian is pleased to be able to announce a new state-of-the-art foam concentrate designed specifically to resolve this issue. It is an addition to the PFC Free range of foams and is called 'Re-Healing Foam H+'.

'Re-Healing Foam H+' is specifically manufactured to deal with ammonia spills, allowing firefighters to control and secure an incident without compromising safety.

For more information on these new products and to review our current range of PFC Free foams which include Re-Healing Foams RF3 & RF6 for hydrocarbon fires, Re-Healing Foam RF3x6 ATC for polar solvent fires, Fire Brake a USDL listed Class 'A' Foam and of course our Solberg TF5X Training foam please visit us at the Interschutz Exhibition in Hall 5 Stand F29

Solberg with offices in Norway, UK and Australia is an innovative, forward thinking foam manufacturer and very aware of its environmental responsibilities. At Interschutz, this company has decided to focus 100% on their PFC free foam range.

Besides the Fire-Brake class A product, often just at forest fires and also suitable for tyre-fires they would like to inform visitors also about their PFC free Class A and B product line: Re-Healing Foam™


Foam Monitor Tower


CO2 low pressure system


Foam tank with nitrogen pressurizzation


El Mist Nozzle

Within this group their are two new products: One, Re-Healing Foam MB, especially designed for the municipal fire-brigades, it is suitable for extinguishing Class A fires as well as Hydrocarbon fires including bio-fuels E15 up to E95. The other new product is Re-Healing Foam H+(+ at right top corner) which can be used to cover Ammonia-spills.

We like to welcome everybody on our Stand no F29 which you can find in Hall 5.

SPP PUMPS LTD

HALL 1, STAND NO. F15

SPP Pumps Ltd is the world's leading specialist manufacturer of quality fire protection products including fire pumps, pump packages, pre-fabricated pump houses and fire pump system remote monitoring solutions. Unrivaled experience in design and manufacture together with advanced testing and accreditation ensures the utmost in equipment reliability.

SPP fire pumps are proud to comply with the demanding requirements of the Loss Prevention Certification Board (LPCB), Factory Mutual Approvals (FM), Underwriters Laboratories Inc. (UL), APSAD, CNBOP, ZUS, PSB and ANPI.

You will find SPP products in major airports, oil and gas installations, in many of the tallest, most prestigious buildings around the world and in the channel tunnel between the UK and France. In fact, you will find SPP fire pumps wherever people and property need to be protected from the devastation of fire.

The protection of life is not a matter for compromise. This is particularly true for fire protection systems where they are only as strong as their \weakest link'. Any compromise could result in avoidable loss of life or property.

That is why SPP fire pump products are designed specifically for the very particular needs of fire protection and are approved by most of the major fire protection bodies around the world.

Fire pump approvals are essential for the peace of mind of those that build, operate or use buildings. The approval demonstrates that an independent assessment has been made of the fire pump manufacturers' products and processes and maintain that they conform to current industry standards.

See a demonstration of the latest SPP remote monitoring capability on stand F15, in Hall 1.

VICTAULIC

HALL 1, STAND NO. J62

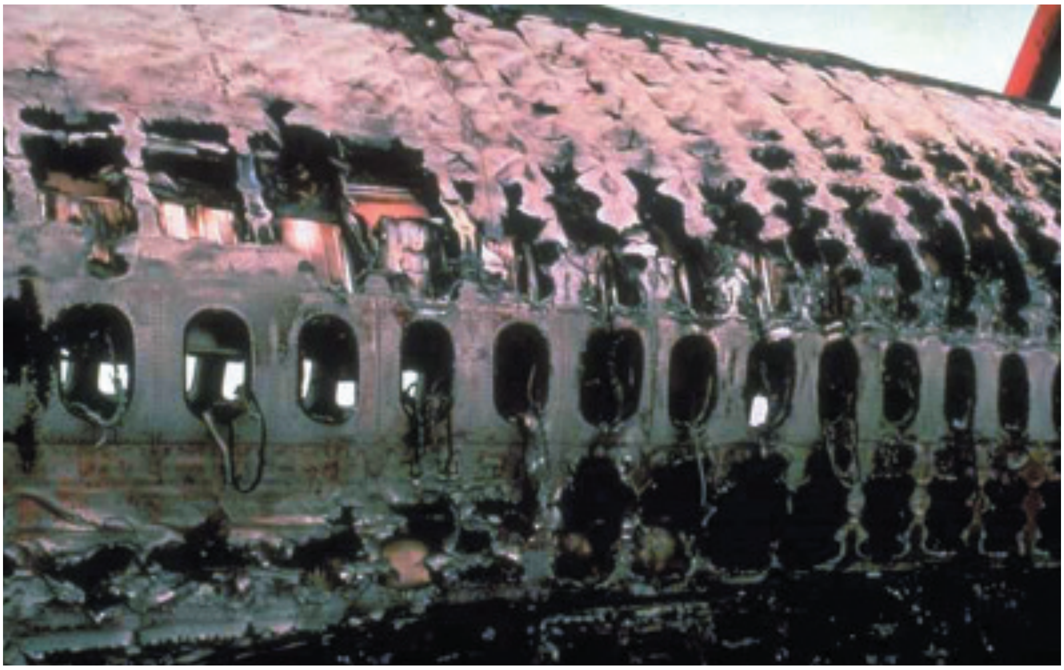
Victaulic, the world leader in mechanical pipe joining systems, is showcasing its latest fire protection solutions at INTERSCHUTZ. The main product on show will be its new FireLockEZ® Style 009H Rigid Coupling with its pre-assembled, no-loose-parts approach to installation.

Based on feedback from contractors, the revolutionary FireLockEZ® Style 009H Rigid Coupling is designed as a lightweight, installation-ready coupling. It is a fast, simple coupling solution that is safe to install, even with hand tools, and delivers a solid performance. It has no loose parts to drop or cause injury, ships to the jobsite ready to install and offers the fastest installation times currently on the market.

The Style 009H Rigid Coupling is available in DN32 – DN100/42.4 – 114.3mm sizes and is FM and VdS Approved and cULus Listed for fire protection services up to 2517 kpa/365 psi. Frank Lewandowsky, Fire Protection Manager for Victaulic in Germany, comments: "We have chosen to showcase the FireLockEZ® Style 009H Rigid Coupling at INTERSCHUTZ as it is central in terms of cost, time and maintenance benefits for any consultant involved in the design, installation or management of a fire protection system. With the built-in speed of installation of the FireLockEZ® Style 009H Rigid Coupling, we are expecting the range to be very popular throughout Europe and internationally."

Victaulic fire protection products are employed in some of the world's most prestigious building projects, such as the Sony Centre in Berlin, the Alexandria Library in Egypt, the Grand Media Towers in Indonesia and the Shanghai World Financial Centre.

For more information, visit www.victaulic.com



The Phaseout That Didn’t Happen

AFFF Foams Move into the Future

It has been ten years since 3M sent a shock wave through the fire protection industry with their announcement that they would end production of PFOS-based AFFF foams because of environmental issues with the fluorosurfactants they contained. This is also about the time that many so-called “experts” said that all AFFF foams would be phased out of production for similar environmental reasons. Instead, telomer-based AFFF foams continue to be the agent of choice to protect against flammable liquid fires, and manufacturers have developed enhanced foam formulations with reduced environmental impacts that can be used well into the future. Why were the experts wrong in their predictions?

By Tom Cortina

Fire Fighting Foams Coalition

Halon experience colors industry view

Part of the reason for the speculation about a possible phaseout of AFFF foam after the 3M announcement was that at the time, the fire protection industry’s only real experience with environmental regulation was the phaseout of halons as ozone-depleting substances. Based on this experience many people in the industry assumed that this is how environmental regulation works; a chemical is determined to have some negative impact and is banned from future production. In reality, however, the phaseout of ozone-depleting substances was a unique situation. Most environmental regulation focuses on the toxicity of a substance and has the goals of reducing emissions to the environment and exposure to humans. Very rarely are chemicals actually banned from production. For ozone-depleting substances, the focus was atmospheric effects and it was determined that the only way for the ozone layer to recover fully was to end the worldwide production of these chemicals.

The other reason for speculating about a possible phaseout of AFFF was business related. Companies selling non-fluorosurfactant foams saw an opportunity to use the negative publicity surrounding the 3M announcement as a way to enhance sales of these less effective alternatives. Unfortunately that practice continues today, even though it seems clear that global regulation of AFFF is not on the horizon. We continue to see articles in fire protection journals from manufacturers of fluorine-free foams that contain misleading and in some cases false information about the environmental impacts and future regulation of AFFF. The strange thing about this situation is that many of these same companies also sell AFFF. If they actually believe what they write in these articles, that

fluorosurfactant foams are not safe for the environment, why do they continue to sell the products?

Focus on fluorosurfactants

Historically, most of the environmental concern related to fire fighting foams has focused on aquatic toxicity and residual foaming, which can be a concern for local waterways and sewage treatment systems, and are common problems for all foams[1]. Starting about ten years ago the focus shifted to the fluorosurfactants that are a key ingredient in aqueous film-forming foams (AFFF). Fluorosurfactants provide AFFF with the required low surface tension and positive spreading coefficient that enables film formation on top of lighter fuels. It is this film formation capability that gives AFFF its name and its effectiveness against flammable liquid fires. AFFF agents provide rapid extinguishment, burnback resistance, and protection against vapor release.

Fluorosurfactants and related fluorochemical polymers are used in many applications besides fire fighting foams including paper and packaging, textiles, leather and carpet treatment, and coatings. Some of these fluorochemicals and/or their persistent degradation products have been found in living organisms, which has drawn the concern of environmental authorities worldwide and led to both regulatory and non-regulatory actions to reduce emissions. The focus of these actions has been on fluorochemicals that contain eight carbons (C8) or more such as PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoic acid).

3M used a unique process to manufacture the fluorochemical surfactants contained in its fire fighting foams. This process is called electrochemical fluorination (ECF), and fluorochemicals produced by this process both contain and degrade into PFOS. 3M stopped the manufacture of PFOS-based foams in 2002, and regulations in the United States (US), Canada, and the European Union (EU) act as a ban on new production. EPA regulations do not restrict the use of old stocks of PFOS foam in the US. Regulations in the EU and Canada require old stocks of PFOS foam to be removed from service in 2011 and 2013, respectively. Excess stocks of PFOS foam concentrate can be destroyed by high temperature incineration at any approved hazardous waste destruction facility for a relatively low cost.

All current manufacturers in the US and Europe use a process called telomerization to produce the fluorosurfactants contained in their fire fighting foams. Chemicals produced by this process are generally referred to as telomers. Telomer-based foams do not contain or degrade into PFOS. They are not made with PFOA, but may contain trace levels as a contaminant of the manufacturing process. It should be noted that there is continued production of PFOS-based materials for AFFF applications in China despite the restrictions in other regions of the world.

Global stewardship approach

Rather than regulate emissions of PFOA, the US Environmental Protection Agency (EPA) developed a global stewardship program that has been adopted by other countries such as Canada. Under the program eight fluorochemical manufacturers have voluntarily agreed to reduce 95% by year-end 2010 and work to eliminate by year-end 2015 both plant emissions and product content of PFOA, PFOA precursors, and related higher homologue chemicals. As a result, telomer-based fluorochemicals that are used in fire fighting foams are likely to transition to only six carbons (C6) or fewer in order to comply with the global stewardship program. This will require some reformulation and likely some type of re-approval of most current AFFF, FP, and FFFP foam products between 2010 and 2015. There are telomer-based AFFF agents that have been on the market for decades that contain greater than 95% C6 fluorosurfactants and meet the world's most challenging foam standards, so manufacturers are confident that the new products will retain all of the same fire suppression capabilities as existing AFFF agents.

Environmental update

Over the past several years makers of telomer-based products, not surprisingly, have undertaken more intensive study of the toxicology and environmental fate of their products. For AFFF this research has focused on the predominant breakdown product of the C6 fluorosurfactants they contain, which is commonly referred to as the 6:2 fluorotelomer sulfonate (6:2 FTS)[2]. Although there have been articles and conference presentations that claim the 6:2 FTS to be a PFOS analog, the scientific data do not support this allegation. A broad range of existing data indicate that 6:2 FTS is not similar to PFOS in either its physical or ecotoxicological properties[3,4,5,6]. Recent studies on AFFF fluorosurfactants likely to break down to 6:2 FTS show it to be generally low in acute, subchronic, and aquatic toxicity, and neither a genetic nor developmental toxicant. Both the AFFF fluorosurfactant and 6:2 FTS were significantly lower than PFOS when tested in biopersistence screening studies that provide a relative measure of biouptake and clearance[7]. Aerobic biodegradation studies of 6:2 FTS in activated sludge have been conducted to better understand its environmental

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fate. Preliminary results were reported at the Reebok foam conference in July 2009 and a publication is in preparation[8].

Work has also been done on a possible contaminant that may be found in trace quantities in AFFF-type fluorosurfactants: perfluorohexanoic acid (PFHxA). Extensive data on PFHxA were presented at an EPA PFOA Information Forum in June 2006 that gave a very favorable initial toxicology (hazard) profile[9,10]. Additional information was presented in September 2007 at a major foam conference in the UK (Reebok) that further supported the favorable toxicology profile of PFHxA[11]. Preliminary data were shared on four major toxicology end points: sub-chronic toxicity in rats, reproductive toxicity in rats, developmental toxicity in rats, and genetic toxicity. It was noted at this conference that PFHxA was neither a selective reproductive nor a selective developmental toxicant. In addition it was clearly shown to be neither genotoxic nor mutagenic. Combining these data with those presented in June 2006 provides significant evidence that this particular end product has a low hazard profile based on current data.

Fluorine-free foams

Foam manufacturers continue to evaluate many types of potential products that do not contain fluorosurfactants, but efforts to date have not yielded working products with fire performance across all fuels and in all operational circumstances equal to film-forming foams. Some fluorine-free foams can provide an alternative to AFFF in some applications, but they are not currently able to provide the same level of fire suppression capability, flexibility, and scope of usage. A recent paper from the University of Newcastle shows that standard AFFF foam can suppress n-heptane vapor for 140 minutes, while the best available fluorine-free foam under the same conditions held for only 60 minutes[12].

Fluorine-free foams are often championed as "environmentally-friendly" alternatives to AFFF. Although such foams may not contain fluorine, their environmental profile related to biodegradation, acute toxicity, chemical oxygen demand (COD), and biochemical oxygen demand (BOD) is typically no better than fluorine-containing products and in many cases is not as environmentally responsible in use as AFFF. A recent study of commercially available fire fighting foam agents indicates that fluorine-free foams are at least an order of magnitude higher in aquatic toxicity than AFFF agents[13].

Moving forward

AFFF and fluorochemical manufacturers have worked closely with environmental authorities over the past decade, and are currently doing the research and testing necessary to incorporate into their AFFF formulations the new fluorochemicals that are being developed to comply with global stewardship programs. This work will ensure that safe and effective AFFF agents that meet new and challenging environmental requirements will continue to be available to fight flammable liquid fires in military, aircraft, industrial, and municipal settings. IFP

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Mikado House equipment. Pic courtesy Novenco

Modern Water Mist Technology

By Matthias Ecke

Secretary General, International Water Mist Association

The history of modern water mist technology for fire-fighting has been discussed in detail in one of the last articles by the International Water Mist Association, and the specific advantages and efficient fire-fighting capabilities of water mist are widely known by now.

Water mist technology at present has become a well accepted and well established fire-fighting technique throughout the world. However, the rather slow development and introduction of mandatory standards prevents this technology from spreading even faster.

30 years ago the ban of Halon as extinguishing agent and new requirements by the International Maritime Organization to install marine sprinklers on passenger ships mainly leveled the way for so called modern water mist systems.

When the first Halon systems were replaced by water mist systems about three decades ago, one could find very often the perception that water mist systems have to always extinguish fires. However, these systems can also be designed to control or suppress potential fires as we usually see in applications where conventional sprinklers are being installed. This is just a question of the objective that is pursued.

Water mist systems are more and more designed as sprinkler equivalent systems where fire control or fire suppression is the required objective. Today we find a considerable and large variety of different applications for water mist systems around the globe. However, what are these applications? This article intends to give some answers and will address some real life sample installations where the fire-fighting capabilities of modern water mist systems are actually utilized.

The Oasis of the Sea – state of the art vessel yard technology meets state of the art fire-fighting technology

The International Maritime Organization has been revealed as one of the driving forces for modern water mist technology. At the beginning of the 90's the IMO had to realize that new requirements for the safety of lives on passenger ships had to be brought into force. The serious fire catastrophe on the passenger ferry *Scandinavian Star* in April 1990 is considered the key moment for the development of these new requirements. It became rapidly obvious that conventional sprinklers are not applicable due to the big amount of water needed and the heavy piping. Particularly high pressure

Oasis of the Seas.
Pic courtesy STX Europe

water mist systems are considered an excellent protection technology onboard passenger ships. Up until now a few hundred water mist systems have been installed on passenger vessels. One of the newest and most famous cruise liners carrying a water mist system is the *Oasis of the Seas*.

The vessel was built by Aker Yards, Turku, Finland, for Royal Caribbean Cruises Ltd. and was delivered on the 28th of October 2009. This ship is currently the largest passenger cruise vessel in the world. It is 361 meters long, 47 meters wide and 65 meters high. The 225.000 gross tones Oasis of the Seas is able to carry 5400 passengers. It provides 2700 cabins to accommodate its passengers, and all cabins are protected by the high pressure water mist system. Besides that the public and services spaces such as shopping and storage areas are equipped with the water mist system, too. Moreover, the laundry and galley ducts as well as the deep fat fryers in the kitchen area are protected by water mist nozzles. Finally, an additional water mist system in the machinery provides a higher level of safety than actually required.

Altogether roughly 15,000 high pressure water mist nozzles have been installed and approximately 90 kilometers piping of different diameters has been mounted into the vessel. The whole system is divided into 126 sprinkler zones driven by two electric pump units.

The National Technical Library Prague – modern architecture combined with modern fire-fighting technology

Whilst one can observe a rather steady market for marine solutions, the market for land based applications is on the contrary constantly growing with growth rates in the two digit area. An interesting example for a water mist installation in an impressive new building is the National Technical Library in Prague.

Technical Library.
Pic Courtesy Fogtec

This building has been constructed between 2006 and 2009 and was opened to the public in September 2009. The building consists of 6 above-ground floors and 3 basement floors. The coverage for each floor is approximately 5200m^2. The library accommodates on these floors bookshelves, lecture areas, exhibition areas, bookshops, a cafeteria, a night study room and other areas.

According to the architects they intended to create "*comfortable ambience for study, mutual meetings and relaxation*" and underlined the social importance of such a meeting point.

The architects and the owner of the building have chosen high pressure water mist for the protection of this building because of a number of reasons. First of all fire tests have proven that the system can effectively protect the building and the interior by using considerably less water. Due to that the expected water and overall damage would be much lower. Moreover, the system would not endanger any visitors in the case of a fire and would allow people to rather escape controlled. Furthermore, the small dimension and the design of the stainless steel piping (piping is visible) lead to the fact that this system could be integrated harmoniously into the architecture of this modern library. Additionally, the significantly less amount of water to be stored for the system was another reason to choose this technology.

Altogether 4000 glass bulb nozzles have been installed in this building and 20 kilometers of pipe work has been mounted. The objective is the control of any fire incident. The fire brigade is expected to arrive within 15 minutes.

Finally, this building provides also modern meeting facilities, and the next IWMA conference in Prague on November 3–4, 2010, will be held partly in this building. Please see www.iwma.net for further information.

The Felbertauern tunnel – innovative solutions put into practice

The major fire accidents in tunnels some years ago lead to a heavy discussion about appropriate safety measures in traffic tunnels. It can be observed that accidents involving burning cars or trucks in tunnels occurring rather often. However and fortunately, these fires do not always trigger big catastrophes as seen in the past. In September 2008 for example a truck caught fire in the Tauerntunnel. Fortunately the truck was carrying fruits and, therefore, the fire brigade was able to prevent a disaster. Even a relatively small fire, however, can severely damage the tunnel infrastructure

*Pump unit tunnel.
Pic Courtesy Aquasys*

since extreme temperatures are reached within minutes. Therefore, it is very important for tunnels to suppress potential fires immediately at its origin without any time delay. Fixed fire-fighting systems are able to provide this safety, and water mist systems have been found to be an efficient solution for the safety objectives in traffic tunnels. Today a number of water mist systems have been already applied to tunnels, and the Felbertauern tunnel shall be named as one example. This tunnel is 5.3 kilometers long and is bi-directional. Due to the missing second tube that could be used for escape the installation of a fire suppression system is of utmost importance. The tunnel was divided into 148 sections and 8000 high pressure water mist nozzles have been installed. Two diesel driven pump units are located in the north of the tunnel and two pump units are located at the south end of the tunnel. These aggregates ensure the necessary water supply. The detection system is able to locate a fire with an accuracy of four meters. The immediate suppression of the fire at its origin prevents the fire from spreading to other vehicles and ensures a cooling of the surrounding atmosphere. The temperatures are kept at a low level and the structure of the tunnel, particularly the concrete, is protected from severe temperature levels that would heavily damage the tunnel itself. Furthermore, people are able to escape from the fire under rather safe conditions.

Mikado House – a new office building in Copenhagen

Reference has been made already to the increasing number of land based applications, and this development does not exclusively refer to high pressure water mist systems which normally operate around 100bar. The number of buildings accommodated with low pressure water mist systems does constantly increase as well. One of the newest projects carried out is the so called Mikado House in Copenhagen, Denmark. The building is an office building with lots of open spaces and an atrium as well. The premises consist of 5 floors and the total floor area is 32,000m^2. This office building is equipped with a low pressure water mist system operating at about 10bar. In this case there is no water storage and the system is directly connected to the main water supply. The pressure pump will provide the necessary pressure if the system operates. The low pressure water mist system combines all the benefits that are known by now. The system uses less water, the piping is smaller and the expected damage is considered less. Furthermore, the system provides excellent cooling of the environment. In total 2300 nozzles have been installed in this building.

International Water Mist Conference 2010

The forthcoming International Water Mist Conference 2010 will take place this year in Prague, Czech Republic, on November 03–04.

The conference is open to anybody and will be an excellent opportunity for those responsible for selecting fire protection to extent the knowledge about water mist technology.

The conference will be held partly at a conference hotel and the National TEchnical Library Prague which is a water mist protected buidling. Attendees, and particularly newcomers, will have the opportunity to join a tour through the buidling and to view the installation. Interested parties can find more information about the conference such as the program on the web page of IWMA www.iwma.net. IFP

*Mikado House.
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Detecting The Right Technology

While great strides have been made in fire detection technologies in the past few decades, the guiding principles remain unchanged – it is all about saving lives and protecting property. Graham Collins explains.

By Graham Collins

It is not that long ago that fire detection was limited to choosing between one or another type of single-sensor device. More recently, highly effective multi-criteria, multi-sensor devises have been successfully developed, aspirating smoke detection is now a well regarded technology, and significant strides have been made in CCTV-based video smoke detection.

But are we as individuals, the buildings we occupy or visit, and the assets we use better protected? The reality is that today we have reached a point where the reliability of the technologies used for detection are far less frequently an issue providing, of course, that equipment appropriate to the fire safety challenge has been installed. Human behaviour is much more likely to be the culprit if a detection installation fails to perform in an emergency or if it false alarms. In all probability an otherwise dependable fire safety solution will be found to have been incorrectly installed, poorly maintained or simply not to have been kept in line with altered working practices or changes of use of the building.

The international trend away from prescriptive measures and towards engineered fire safety solutions has seen any number of impressive structures emerge that a few decades ago would have remained firmly in the architect's imagination. This has placed a huge burden of responsibility on the shoulders of fire engineers, system designers, installers, maintenance organisations and system users. It has, rightly, focused attention on ensuring that devices are selected only if they comply with the appropriate standards and codes of practice, and has witnessed a growing requirement for the installation of detectors and sensors that have

these quality claims underpinned by independent, third-party approval by such organisations as UL [Underwriters Laboratories], FM [Factory Mutual], LPCB [Loss Prevention Certification Board] and VdS [Vertrauen durch Sicherheit].

Irrespective of the technology that is adopted, the primary aim is to protect lives or safeguard property – in many cases, both – by detecting an incipient fire as quickly and reliably as possible. Certainly, there is no single solution; no one device that can be relied upon to operate effectively with fires that can range from slow smouldering to fast-flaming hydrocarbon fires, and environments that can span from cellular offices to aircraft hangers. So, let us take a brief look each of the current options.

Detection options

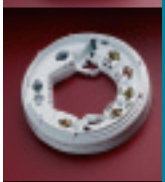
Traditional fire detectors are designed to detect smoke, heat or flame and can be either "conventional" or "addressable". In a "conventional" or "non-addressable" installation, these detectors are in one of two states – normal or alarm – and individual detectors are not identified or given a specific "address" or location. In an "addressable" installation, every sensor has its own unique "address" on the system's control panel. The custom is that non-addressable devices are usually called detectors, while addressable devises are most often termed sensors.

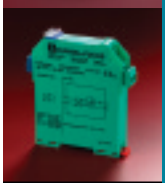
At one time, ionisation detectors were used for detecting smoke but, despite being very effective for detecting small particles of combustion produced by fast-flaming fires, these are now less acceptable in many countries due to their radiation content and issues surrounding their shipment and ultimate disposal. Their place has been taken by optical or photoelectric devices where, in the majority of designs, smoke particles are detected using light scatter or obscuration techniques. Heat detectors come in one of three main types: fixed heat detectors; rate-of-rise detectors; and linear heat detectors, and detect temperature changes using a temperature-sensitive resistor called a thermistor. UV and IR Flame detectors are also available but are appropriate only for certain specific fire risks that usually involve flammable liquids or gases.

Alongside improvements in the reliability of these detectors, the most significant advance in this area was probably the development of multi-sensor devices that increase the probability of detecting a fire. For some time, dual-sensor devises have been available that combine both heat and smoke detection, and heat detectors can be installed that offer both fixed temperature and rate-of-rise detection in a single device. A number of manufacturers have also introduced tri-sensor devices, in which the smoke and heat detectors are augmented by the addition of a carbon monoxide sensor.

Most recently, dual optical technology has been adopted by some manufacturers, notably in Gent by Honeywell's S-Quad and Nittan's latest Evolution sensors, and dual optical smoke detectors have been introduced alongside combined dual optical and heat multi-detectors. In this type of detector, the optical chamber either contains two optical paths at different angles, or two different wavelengths of light. In both cases, the two signals provide information about the nature and size of the particles being sensed, allowing more

Intrinsic safety





Hazardous areas where an explosive mixture of air and gas or vapour may be present requires electrical equipment that cannot cause an ignition – not only in normal operation but also in fault conditions. The most common method of achieving this is intrinsic safety.

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accurate differentiation between products of combustion and non-fire particles that might otherwise trigger a false alarm.

There are also a number of special application devices, such as beam detectors, duct detectors, intrinsically-safe detectors, waterproof and marine-approved detectors manufactured by such companies as Apollo, System Sensor, Hochiki and Notifier by Honeywell, which has just unveiled its new Opal range of detectors. Radio Wireless detection that uses radio technology is another option that is available from such companies as EMS, which has just unveiled FireCell that uses what the company calls "smart cluster technology", and Cooper Fulleon, which recently launched its Radio+ system. These systems are claimed to offer faster and simpler installation, and lower cost when compared with the conventional wired detection systems.

Irrespective of the particular type of detector that is installed, a major consideration that needs to be taken into account is the protocol of the system being considered, as the decision can impact on the life-time cost of the detection system. Protocol is the language used by electronic products to communicate with each other and can be classified as "open protocol" or "closed protocol".

Public expectations concerning personal safety, fire safety legislation, health & safety legislation, escalating insurance costs and a general feeling of insecurity in a troubled world have undoubtedly helped to fuel many of the developments in fire detection in recent years.

Open protocol systems are where the detection components are compatible with products produced by other manufacturers, whereas closed protocol systems offer, as the term implies, no such flexibility. So, specifying a closed protocol system does tie the user to the manufacturer of the system for the lifetime of the system for any upgrading, replacement parts, servicing or modification of the system. An open system though enables the system owner to choose a different company to service the system, or supply other components.

Air-sensing detection

Aspirating smoke detectors sense microscopic smoke particles in a sampling chamber and these systems have become particularly popular in applications where the presence of traditional sensors and wiring is aesthetically unacceptable.

However, while aspirating smoke detection is most commonly associated with museums, galleries and religious buildings, one of the contracts currently being highlighted by Xtralis for its VESDA aspirating smoke detection system illustrates how broad the appeal now is for this detection technology. VESDA systems are covering more than 290 underground railway stations, retail shops and escalators in the Madrid Metro environment. Other global players in this sector include Wagner and AirSense Technology.

Essentially, an aspirating smoke detection system comprises a central detection unit that draws air through a network of pipes to detect smoke particles suspended in air, using light scattering technology. Aspirating smoke detectors are highly sensitive and can detect smoke before it is even visible to the human eye.

Video detection

Video smoke detection – often abbreviated to VSD – is based on the computer analysis of video images provided by standard CCTV cameras. The particular motion pattern of smoke is automatically identified and analysed in real time by applying digital image processing techniques to provide a fast response to a potential fire. It is particularly appropriate for voluminous areas, high ceiling buildings, where a high airflow may be present and for external applications. VSD systems can now be found protecting forests, tunnels, aircraft hangers and industrial buildings and the major system suppliers in this field include D-Tec, Fike and Notifier by Honeywell.

Clearly, one of the key benefits of these systems is their ability to use existing CCTV cameras that would have been installed originally for security surveillance. These systems generally work by looking for small areas of change within the image at the digitisation stage and pass only these pixel changes to the main processor for further filtering. The video information is passed through a series of filters that seek particular characteristics that are associated with smoke behaviour. Further analysis is carried out on the filtered characteristics to determine whether all the conditions have been met for the system to confidently predict the presence of smoke.

Things to come

Public expectations concerning personal safety, fire safety legislation, health & safety legislation, escalating insurance costs and a general feeling of insecurity in a troubled world have undoubtedly helped to fuel many of the developments in fire detection in recent years. At the same time, the high price-tag associated with false alarms has ensured that manufacturers strive to improve existing products and develop new technologies that are ever more accurate, dependable and robust. Certainly, we have come a long way from the time when fire detection depended upon the diligence of a night-watchman.

Many of these changes have been possible thanks to the increased sophistication, reliability and cost effectiveness of electronics generally, data processing, digital technology and the ability to have real-time control via the Internet. The industry though remains, quite rightly, conservative. So the next steps in fire detection are likely to be evolutionary developments of current proven technology rather than ground-breaking advances. But who knows. IFP

EN54 versus UL'864'

A case of double standards...

In this article Mike Troiano President of Advanced Fire Systems Inc. describes the differences and synergies between US & European fire systems and gives examples of future convergence.

By Mike Troiano

President, Advanced Fire Systems Inc.

Companies, whose main goal is to engineer and develop fire detection systems for application in the world's global markets, have a major, almost insurmountable task on their hands. One of the most significant challenges they face is the differences in fire codes and standards. Despite attempts that have been ongoing for over a hundred years to agree on common fire codes and standards, the end is still not in sight. Not only are there differences continent to continent and region to region, but in Europe there are differences in requirements from country to country and in the US state to state and even in some instances city to city.

To make matters more complicated, fire codes and standards effect: 1) the way the products themselves are designed and how they must perform, 2) the way that the system shall be installed, effecting for example the wire types, location and spacing of smoke detectors, sounders and strobe devices, 3) how a system is operated once installed, and by whom, 4) how and when a system shall be serviced and maintained over time, 5) the manner in which fire departments and fire brigades are notified and ultimately respond to the report of a fire and 6) As the world speaks more than just English!, the operating language.

Two major standards dominate the world market, the US National Fire Protection Association (NFPA) based UL'864' and European EN54. Both standards have the best interests of fire detection, fire prevention, building and life safety at heart and have committees made up of leading fire authorities and experts constantly searching for and seeking to improve the way that fire systems perform.

In Europe, despite adopting the EN54 standards, each country has their own unique requirements. For example, in Sweden and Germany, you can't have a system installed there without a common user interface that includes a "Fireman's Key," which enables control. The principle here is that they don't want their fire fighters having to learn every nuance about every fire system sold in their country, so all systems sold in Sweden and Germany must have common style interfaces designed to a specific standard for use by the fire fighters.

Today, Voice Evacuation and Fire Fighter Telephone Communication Systems, although in common use in the USA, are not widely in use in the EU. Voice Evacuation might be seen in large sports stadiums, but not typically in other commercial, industrial and residential applications. Fire Fighter Telephone Communication Systems remain in use today in many of the US states, although in some states there is a trend toward replacement with high end, radio communications systems.

It is very common in the USA to have the status of a fire system transmitted over phone lines, or more recently the internet, via a stand alone or integrated Digital Alarm Communicator

EN54 (Germany) Penta Control Panel

UL864 9th Edition (America) AX 'V' Series Integrated Fire & Audio Panel

Transmitter (DACT) to 3rd party Central Stations. These stations monitor 24 hours per day, and have the responsibility to contact the fire department in case of emergency, along with the property owner and service company. In Europe the use of DACTs is much less prevalent and it is common in certain countries to have alarm communications direct to a municipal station or fire brigade via hard wired routing equipment.

In some USA states, it is common to see a requirement for a City Box interface. City Boxes came into existence in the late 1800s and although mechanical wheels have been replaced with electronics, the principles remain the same. Basically a system going into alarm transmits a signal over a pair of wires that run directly from the facility to the City Box, then onto the fire municipality or fire station.

When comparing two fire panels that have been designed toward complying with the NFPA versus the EN standards, they are quite dissimilar. Further yet, if one were to compare one manufacturer's fire panel to a competitor's fire panel in the same market, once again one will find sharp disparities. There is no truth to the statements: "a fire panel is a fire panel" or "all fire panels are the same." In fact nothing could be further from the truth.

It would be impossible in such a short article to list all of the many differences and similarities, but below is a summary of some of the major issues:

USA versus EU – Major differences

AC/Mains Operating Voltage: The USA is in the minority compared with the rest of the world in that its primary supplied voltage is nominally 120 Volts, 60 Hertz. The majority of the world is 230 Volts, 50 Hertz. However in all cases the AC/Mains voltage supplied in the various countries fluctuates plus or minus some percentage of nominal. In addition, the power supplied is not always "clean" and must be filtered by the fire system or else power line "glitches" can cause false alarms and other problems.

Wiring Types: The quality and variety of the different types of fire system cabling allowed by the various regional standards is surprising. Wires may be thick or thin, shielded or not, mineral insulated, highly capacitive, have various levels of fire protective ratings and current carrying capacity, etc. However in all cases wires carrying high voltages and currents versus those carrying any low voltage communications signals must be separated with the separation distances specified, and the circuits the wires connect to require different levels of safety protection.

Message Terminology Examples – Alarms vs. Fires, Troubles vs. Faults, Supervisory vs. N/A, AM-PM vs. 24 hour clock, Fahrenheit vs. Celsius. In the USA, when a detector goes into alarm or a pull station is activated, it is viewed and reported as an Alarm. In Europe and other parts of the world, this same condition is viewed and reported as a Fire. If there is a problem in a fire system such as from a dirty smoke detector, a broken wire or a low battery for instance, USA fire systems view and report this as a Trouble Condition, whereas others see this as a Fault in the system. NFPA

EN Manual Call Point

US Horn/Strobe

ALARM CODES

EN Sounder Beacon

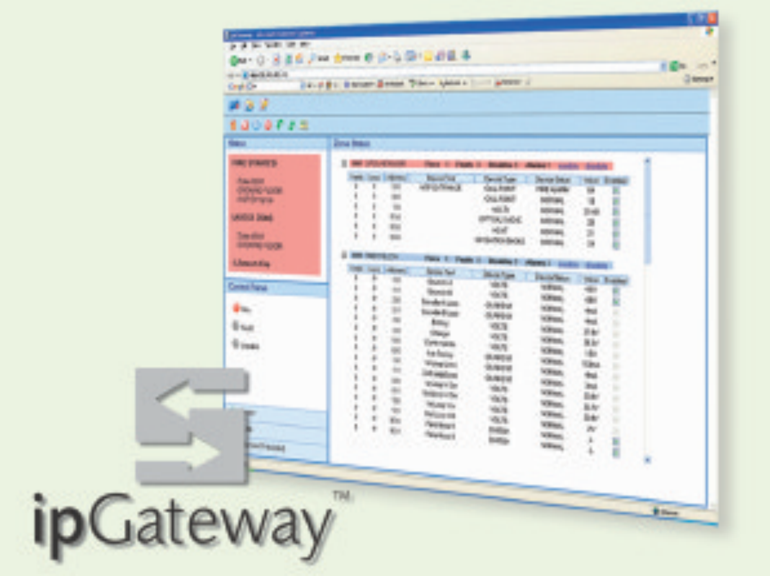
Codes and Standards recognize problems with a monitored Sprinkler system as a Supervisory Condition and so is treated uniquely different than other trouble conditions, whereas EN54 has no such separate recognition/distinction. In the USA, systems time stamp events using a 12 hour clock with AM and PM designations, whereas Europe uses a 24 hour clock, so for example 2:00 PM is 14:00 hours. It is common throughout the EU and much of the world to measure temperature in degrees Celsius where the USA measures in Fahrenheit.

User Display – Both US and European systems prioritize Alarms (Fires) but present the information in different ways. For example if multiple fire alarm conditions are reported, which gets displayed, the first or most recent event? Is the system allowed to scroll the messages automatically or manually? Is the total number of devices or zones in alarm displayed? Must the display show the type of device in alarm, etc., etc., the standards are quite prescriptive and diverse in all of these areas. Also there is a great deal of dissimilarity between what must be displayed when there is a mixture of alarms (fires), troubles (faults), supervisories, and non fire events occurring at the same time. Finally, while still complying with the required standard, the equipment must support and display the information in the language required by the installation.

Switches/Buttons – Reset, Silence vs.Silence/Resound, Acknowledge, Mute, Fire Drill and Evacuate. The requirements for what happens in a fire system when a Reset switch is pressed varies country to country and even city to city, especially if the system is installed in a high rise facility. For example in New York City, a reset switch cannot interfere with air handling systems. The Silence/Resound button on an EN54 system allows alternate presses to Silence or Resound sounding and/or strobe devices, but typically, only the Silence function is presented on a USA based system. Other switches of distinction are: Acknowledge (USA), Mute (EU), Fire Drill (USA) and Evacuate (EU).

ADA – In the USA, a law was passed in 1990 called the "Americans with Disabilities Act" and it affected fire systems such as requiring the synchronization of strobe lights and their luminous intensity levels as well as affecting the sound levels of sounding appliances measured in dB (decibels). In Europe, there are equivalents (i.e. DDA – Disabilities Discrimination Act in the UK) standard with the same intentions in mind, but there are differences including the sound levels, spacing of devices, luminous intensity levels, etc., and how these levels are measured by 3rd party approvals agencies is different. Such differences have a major impact on the fire panel and system design due to the extreme differences in the voltages and currents, the backup battery size, system wiring, and programming options.

Virtual Panel Display showing Loop with on board Meter



Advanced ip Gateway for remote fire system monitoring

Loop Power Technology – In the EU, it is common to have a fire alarm system contain on the same pair of wires: smoke detectors, call points (pull stations), input/output modules, strobes and sounder devices. All of these devices receive their power and communication control signals over the same pair of wires. Due to the combination of their low operating currents, installation and operations standards, as well as safety standards, such a design has large ramifications in the reduction of power consumption, backup battery requirements, wiring and labor costs. Loop power technology has not yet been fully embraced by the USA, but certain forward thinking manufacturers of Fire detection equipment (such as Advanced) are well on their way to bringing this technology to the US Market.

EU Country Differences – While the EN54 Harmonized Standards are accepted by the EU member countries, it is important to note that each country has an "options with requirements" exception to the EN54 standards that must be adhered to. No two country requirements are the same, with France standing out as the most drastically different from the others in that they require the system power supplies and system wiring to be supported completely separate in a self contained enclosure from the User Interface – key switches and display.

USA Regional, State and City Differences – Some examples of different requirements across the USA include the following areas: Fire Department Communications -City Box, Radio Transmissions, DACTs and Mesh Networks. Hi and Low Rise applications – Smoke Control Systems, Elevator Controls, Fan and Damper Controls, Automatic and Manual Voice Evacuation, Fire Fighter Telephones. Non Fire interfaces to – Facilities Management Systems, Graphics Annunciation, Video Monitoring systems, Nurse Call systems, etc.

Advanced Technology is Universal – regardless of the country, city or town and regardless of the national and local fire codes, smarter global manufacturers are applying advanced technology and global experience to the best benefit possible.

For example, the better systems provide peer to peer network topology and deliver high speed performance regardless of the number of panels or nodes on the network. That means that when a switch is pressed to perform a life safety function, it always responds as it should, regardless of network traffic or conditions present on the system. The same goes for any message that has to be displayed or the fast response to a fire or life safety condition. The networked user displays on these systems are capable of viewing an entire system and can be customized to suit the application.

Smarter systems include built-in intelligent voltage and ammeters which allow technicians to assess the voltages and currents on any wires in the system, 24/7, regardless of the state of the system. In the more advanced type of systems, these meters can be turned on and viewed at a control panel, or from a remote location via PC based monitoring and control software.

IP Technology is becoming more prevalent through the use of secure IP Gateway technology, such that systems may be monitored locally and/or remotely as well as providing Email and text message alerts. Quite often not only does this allow the maintenance company to provide enhanced service support to their installed base of systems, but facility managers may be given remote access to the system in order to give them piece of mind that their system is performing properly every second, minute and hour of every day.

Mike concluded that by applying their expertise of global standards, local market requirements and technology the Advanced group of companies have brought together a truly advanced range of fire and life safety products which go together to provide systems which meet and exceed the various market requirements not just in the US and Europe but also across the globe. IFP

US Pull Station

A challenge for manufacturers was to simulate break glass activation in the resettable call point, given the deterrent glass has proved to offer in terms of reducing false alarms

Call point evolution: past, present and future

By Ges Wallace

Managing Director, STI (Europe)

Break glass call points can hardly be called the new kid on the block in terms of fire detection and alarms. They have been used as the means to manually activate a fire alarm for decades, with their forerunner, the simple switch based street fire alarm, going back as far as the turn of the 20th Century. While the introduction of the means for people to raise the alarm in the event of a fire has undoubtedly been a major contributor to fire safety, so it has brought with it the problem of false alarms, a problem that prevails today and one that the fire industry, the fire service and building owners throughout the world continue to grapple with.

In the beginning

In the earliest devices, the simple switch was located inside a box, sending a signal to the fire service when operated. In London, by 1900 some 675 fire alarm boxes were installed, significantly improving communication and reducing response times. By 1936 this number had increased to 1,732 but already it was apparent that the issue of false alarms would need to be addressed. Of some 9,297 calls received in 1936 by the London brigade, 3,422 (or over 30%) were false alarms. Given the newness of the technology and the vagaries of London's electrical circuitry at the time, it is perhaps not too surprising that almost two thirds of those were down to electrical or other malfunctions, but this still means that over 1,300 were the result of malicious activation.

The first attempts to combat this saw manufacturers placing the switch inside a red box. This went some way towards reducing the incidents of false alarms generated by curiosity or malicious intent, but it took the introduction of glass to significantly impact on the problem and make false alarms more manageable. The insertion of a

Early call points used telegraph and telephone signaling techniques to alert the emergency services

glass panel, which anybody activating the call point is required to break to trigger the alarm, is a real deterrent to the casual misuse of an emergency switch. So called 'break glass' call points are now widely used for a variety of emergency switching applications, not just for fire alarms.

Inherent problems with glass

However, while the introduction of glass certainly addressed the existing drawbacks, it brought new ones of its own, some of which were specific to the design of the early break glass call points but others which hold true today. In the early devices, the design of many was based on the switch being held in the operated position, usually in the centre of the glass. The switch subsequently put the glass under stress and, as many break glasses were often installed next to large exit doors, the result was false alarms generated by the glasses breaking without any human intervention other than from the slamming of the door. The switch also ejected the broken glass from the call point onto the floor, presenting another potential hazard. The glass in these types of early devices was unprotected and one widely held theory was that call points were manufactured in red to hide the blood from lacerations caused during their operation!

In 1972 a revolution in call point technology was introduced with the advent of the first break glass call point to address the issues outlined above. The patented design moved the switch of the call point to the edge of the glass, thereby overcoming the issue of the glass being under constant pressure. The glass was also scored and fitted with a clear plastic protective film, holding the broken glass largely in position rather than ejecting it onto the floor. While the glass was still used for its very important deterrent features, it no longer presented a hazard to the user.

This simple approach to the problem provided a truly unique concept that helped create and form the then UK standard for call points, BS5839-2, and even now, almost 40 years later, this approach to call point design is still adopted (albeit with some changes with the introduction of EN54-11, more of which later).

In recognising the undoubted success of this approach, it is important to realise that there are still disadvantages in the use of glass as an operating element. One of the most important is that, once broken, the glass is discarded and a replacement is required. On many occasions I have seen call points in the field with other objects inserted into them to maintain operation – with obvious consequences in terms of fire safety.

Operationally the break glass concept is excellent. Glass offers natural deterrence from misuse. While working with such call points for many years I attended trade shows where we encouraged visitors to come onto the stand and "break a glass". The immediate reaction from most people was an instant refusal. When questioned, the reasons largely revolved around not wanting to destroy the product or a fear of being injured by its operation to the extent that some visitors removed shoes or used other objects to activate the alarm.

Meeting the challenge

The challenge therefore for manufacturers was to emulate the operational and psychological characteristics of glass but with an integral operating element that could be reused – in effect a resettable break glass! Hence the introduction of the 'resettable call point'. This proved another major step forward in call point technology, with a number of resettable products brought onto the market. The resettable option prevents inappropriate 'heath robinson' attempts to put the call point back into action without replacing the glass or, even for those who do follow the correct procedure, eliminates the potential risk of inserting the wrong

Fire Box Traps Pranksters

Demonstrated above is a new fire signal box that locks the hand of alarm sender until released by a policeman or fireman with a key, thus deterring the sending of false alarms.

THE sending of false fire alarms by mischievous persons may be eliminated through use of a newly developed call box. To use the device, the sender of an alarm must pass a hand through a special compartment to reach the signal dial. Once the dial has been turned, the sender's hand is locked in the compartment until released by a fireman or policeman with a key.

Innovative and sometimes unusual ways were adopted to try and reduce false alarms, trapping the hand of the sender until they were released by a policeman or fireman being one of the more extreme approaches

London Underground was an early adopter of resettable call points, recognising the importance of keeping downtime of a fire alarm system to a minimum

glass in the wrong call point. There is another major advantage of resettable call point devices. By eliminating the need for replacement parts after every operation, the call point can be put back into working order and the system reset very quickly, keeping downtime to a minimum – a very important factor in what is a life safety system. Resettable call points were adopted by the London Underground some years ago for this very reason.

Standards

Returning to the issue of standards, BS5839-2, the UK standard for call points, was replaced in September 2003 with the European standard, EN54-11, which permits the use of resettable call points. This new standard, together with demand from the marketplace for a more user and environmentally friendly product which reduces maintenance costs will, in my view, see the end of the use of glass in call points.

Changes in moving from BS5839-2 to EN54-11 were largely an attempt to try and standardise the look of manual call points, as well as addressing major advances in electronics with the inclusion of sophisticated electronics in call points for intelligent fire systems. This is an important consideration since familiarity with the means to activate an alarm, wherever you happen to be, is obviously vital. This provides the all important early warning to enable a safer evacuation of the building and provides the optimum amount of time to tackle the fire.

One major difference between BS5839-2 and EN54-11 is how the operating instructions are presented on the call point. Originally these were white lettering against a black background, which was easily achieved by applying a clear label onto the glass which was printed with the operating instructions in white. The glass was then fitted into a black moulding and the necessary white on black instruction was visible, but the operating element still retained its glass appearance. EN54 reversed this requirement and the operating instruction must now appear black on white. For resettable call points this could be achieved by moulding the operating element in a white material and printing the instructions in black onto its face. However the important operational deterrent properties of glass will have been lost, and this could lead to an increase in false alarms over time. Function marking has also been addressed by EN54-11. European language differences have been overcome through the use of a ‘House Flame Logo’, although the option of reproducing the word ‘Fire’ or equivalent text in the appropriate language is still permissible (again the logo or text must be in white).

The ‘ReSet’

One innovative solution to the problem highlighted above regarding the black on white lettering is the STI ‘ReSet’ call point. Its operating element is moulded in a clear material, overprinted with the required black legend, and assembled against a white moulding. The plastic operating element takes on the appearance of glass, thus retaining its deterrence from misuse.

The patented operating element provides real action on operation and simulates break glass activation. An activation indicator drops into view at the top of the window after the ‘ReSet’ has been operated. The unit is then simply reset with a key and is immediately ready for reuse.This unique approach eliminates glass and encompasses all the benefits of a resettable operating element. Downtime of the fire alarm system is minimised as the

call point can be quickly and simply reset in the event of a false activation. It is very important that we retain the appearance of the use of glass in call points to prevent the possible trend towards a simple push button worded 'Fire Alarm', with the obvious consequences for false alarms. It is important to learn from history and the figures from London in 1936 that we opened with in this article demonstrate all too clearly the dangers of moving away from an approach which features an in-built deterrent to misuse.

Installer benefits

Turning from the benefits to the end user to those for the installer. Resettable units are virtually maintenance free, with the operating element easily reset after activation. There are no glass elements to break, lose or incorrectly fit during installation. Stocking requirements are reduced and there is no possibility of fitting the wrong manufacturer's glass element. Unlike traditional break glass units, which use a key for testing, call points like the 'ReSet' provide a complete functional test with every activation.

Another important point to consider is that call points are often delivered to site well before the building is commissioned and secure. As anybody who has worked on a construction site will testify, damage to products is an all too common problem. Many of the call points will have broken glasses prior to the fire alarm system being fully operational. In order to combat this waste and inconvenience, some call point manufacturers offer call points fitted with a piece of plastic to substitute the glass. While this enables installation, testing and commissioning they do render the call point inoperable. Call point glasses are then delivered to site for fitting at a later date. Unfortunately this practice, while effective in reducing break glass wastage, is dangerous. Call points will often be left with the glass substitute in place after commissioning, rendering the call point inoperable. There is also the danger that the glass substitutes will be retained by the installer or end user and used as a quick-fix when glasses are broken and no replacements are available. All these problems are avoided by using a resettable call point.

Added protection

The use of protective covers on call points, although previously not permitted by BS5839-2, has been accepted in certain situations for more than 20 years in the UK. EN54-11 now recognises this and permits the use of covers to protect against accidental operation, requiring that operator instructions are provided or indication arrows are placed on the cover. Protective covers also perform a crucial deterrence in many applications which are notoriously problematic in terms of false fire alarms, schools being an excellent example. The headline figures for schools demonstrates only too clearly that they remain a prime focus in fire safety terms – the latest estimates from the Department for Communities and Local Government show there are 1,300 school fires a year in England and Wales, representing a cost of £58 million. What these figures do not provide is an estimated cost for false alarms, an issue in many schools along with the extensive disruption to classes, staff and pupils that false alarms inevitably cause through persistent evacuations of a site.

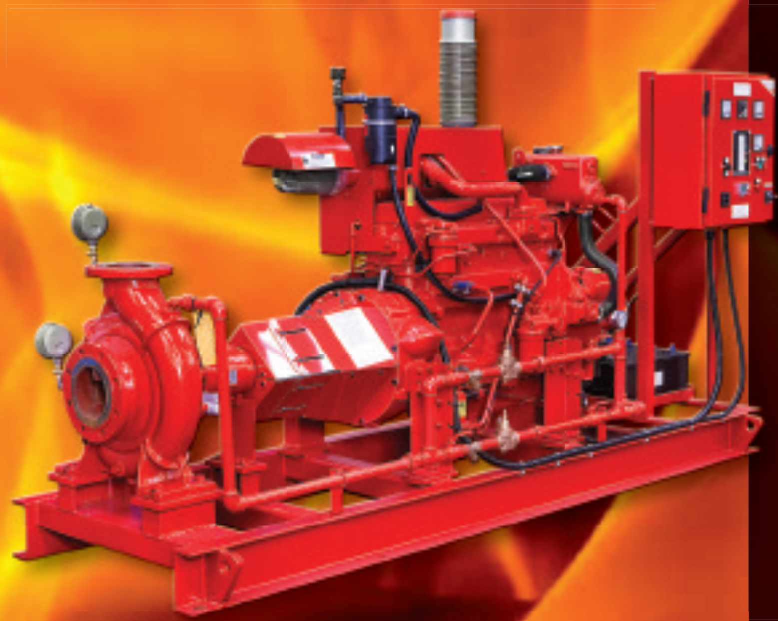
Once a break glass call point has been activated, it is not always a replacement glass that is used to 'reactivate' the unit

There is also the cost of the Fire Service attending a fire call (an estimated £1,000 per call out) and the fact that if a Brigade is at a false alarm it cannot attend a real fire – £1,000 wasted and the impact this has in terms fire cover.

With the recent publication of the Chief Fire Officers Association (CFOA) Policy on False Alarms, the focus on reducing such alarms is now even greater. Consequently, head teachers, along with many others working in environments where false alarms remain an issue, are looking for ways to address the problem. The challenge is to provide added security to prevent malicious or accidental use of a manual call point while ensuring that it remains readily accessible. This is where covers can prove an excellent solution. The cover makes the operation of the call point a much more deliberate act and the operator is forced to linger at the call point in order to operate it.

Protective covers can be integral to the call point itself or be a separate product that can be retrofitted to existing call point installations. To add even further deterrence against malicious activation, in certain circumstances the covers can be fitted with a sounder that emits an ear-piercing alarm if the cover is lifted. IFP

Introducing EN12845 FIRE PUMP LINE



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Remote monitoring a fire pump system status

Initially you would imagine that a system that is tested and approved to stringent standards, runs for only half an hour each week and is regularly maintained would not be an obvious candidate to need remote monitoring. Fire pump packages are such systems but it would be wrong to believe that vigilant monitoring is not required. The consequences to life and property are such that not to do so would be irresponsible.

By David Gentle

Business Development Manager, Industrial Fire, Northern Europe
SPP Pumps Limited

Initially you would imagine that a system that is tested and approved to stringent standards, runs for only half an hour each week and is regularly maintained would not be an obvious candidate to need remote monitoring. Fire pump packages are such systems but it would be wrong to believe that vigilant monitoring is not required. The consequences to life and property are such that not to do so would be irresponsible.

The regular fire pump tests prove the system is working at that time but can you be sure it will work without failure if it is called into action later on? There are many reasons why system performance may be compromised after the test and this short article explains the sort of circumstances that could cause a failure with possibly tragic consequences. The need to keep an eye on the fire pump at all times and not only when periodically tested is what led SPP to develop a remote monitoring system designed specifically for fire pump applications.

Ultimately it is the building operator or manager that needs to assure themselves that fire pump(s) are operational at all times. In the aftermath of

fire, insurance may meet the immediate costs but it has been proven that damage to a business from fire is a multiple of the insurable risk. Such losses could all be saved through something very simple and avoidable.

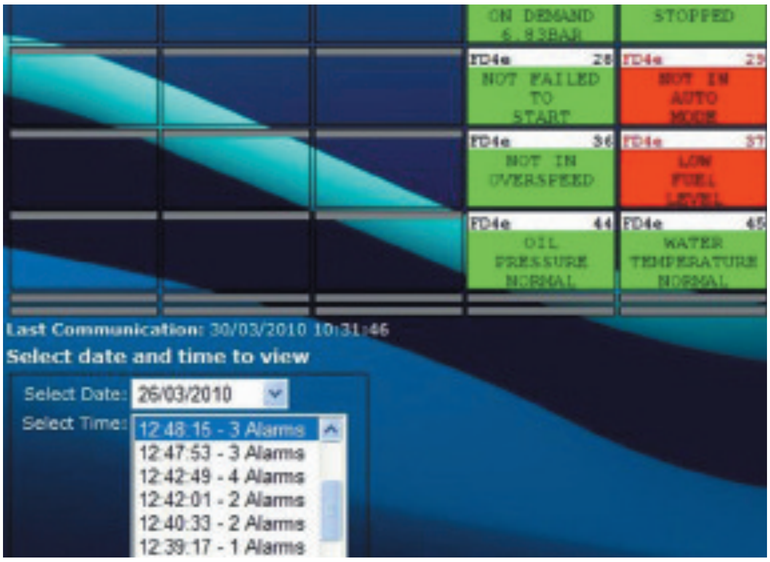
Problems with the pump system can arise from simple oversight, carelessness when doing a simple (and perhaps boring) task, intentional damage caused by a disaffected person, poor maintenance or system misuse (e.g. car cleaning using plant equipment). Each of these is cause for concern but is also preventable using available and affordable technology. This technology can not only help to keep an eye on the equipment but also to identify where it is used inappropriately and confirm its readiness to run.

In many cases faults continue to go undetected. This may result from service operatives being unaware of the fire protection requirements, inadequate hand-over, insufficient knowledge/training which has rendered them ignorant to equipment service requirements or a lack of regard for fire protection significance generally. Operatives might not be qualified service engineers or service-minded at all. Alternatively, faults could be put down to a lack of attention because of resource or time constraints. Weekly tests are sometimes carried out by members of staff whose responsibilities lie normally with security, car park tending and reception each of which can distract from the rare but serious risk from fire.

A lack of information or inexperience of the pump, driver, controller or any other component of the pump room could lead to valves being shut, the engine being starved of coolant water, isolators left in the off position, batteries losing charge or pump sets being left offline/not in automatic mode. System failures can occur because of frozen, bent or broken pipes, leaks as well as low or empty tanks. Inaccurate instrumentation and component failure prove a direct problem themselves but have the potential to cause faults further down the line as well. Pre-empting these faults so as not to cause others seems inarguable.

Wilful tampering by disaffected employee(s) or school student(s) for example is often irrefutable. The repercussions unfortunately cannot be denied. Remote monitoring devices can take inputs from additional pump room (intruder) alarms, valves etc and alert the designated contact person(s) best placed to see damage is minimised further.

A poor understanding or little regard for the importance of fire protection will incur poor and inadequate maintenance from the start. Human error sees alarms being muted and wires damaged with no due consideration. Without remote monitoring problems are likely to persist. If nobody knows it is broken then it is less likely to be fixed, if a



potential failure isn't identified then fewer measures will follow to prevent it. If somebody can put in less effort to complete a task (and get away with doing so) more often than not they will.

The reason might not be apathy. Commercial pressures too induce corners to be cut. There have been frequent instances of a manual log being filled in erroneously giving a deceptive history of an installation and a false sense of security. Repeat data and repeat instrumentation measurements, a column of identical handwriting and the same pen being used over a long record of dates are clues which may rightly allude to the weekly tests being carried out quickly, falsely or perhaps not being carried out at all.

Whether the causes of problems are accidental or intentional, the result can be substantial in terms of financial loss as well as incalculable personal, environmental, social and economic costs too.

Interim and annual service contracts might have existed previously but ceased because of changed building ownership, commercial cutbacks, structural/job changes, job losses or insufficient handover. Where service maintenance is in place, service personnel are often located in distant headquarters remote from the multiple sites they are responsible for.

All these are concerns that can be addressed by remote monitoring of fire pump systems. Benefits can include the ability to recognise and prompt when regular service intervals are due; the evidence to prove pump drivers have been started each week and what alarm was activated when (date and time); direct access to device history on the smallest to today's biggest (multiple pump rooms on one site) installations; alarm occurrence notification from remote locations and low GSM signal areas. Remote monitoring can also highlight where, when and how frequently the equipment is being used outside the operating conditions it is intended for (e.g. jockey pump starts within select durations).

In fire protection there is no room for shortfalls in the processes, procedures or attitudes affecting maintenance and the ability of a system to do its job as needed. There is even less room for poor vigilance in the case of non-preventative, gross intent which gives less or no chance to manage or contain effects of fire devastation. In such circumstances however, even if the pump room, control room, reception or complete structure is lost as a result of fire, logged data on a supported, third party (hosted), remote web server can go some way to be able to provide valuable information after the event.

Whether the causes of problems are accidental or intentional, the result can be substantial in terms of financial loss as well as incalculable personal, environmental, social and economic costs too. Whether circumstances affecting the system are common or infrequent, planned or not, a means is required to monitor in near real time where such misuse, abuse and neglect is taking place in order to prevent them.

Equipping qualified engineers with information to put right first time or pre-empt system failures is a basic requirement. It is useful for them quickly and easily to have the most recent system status and alarms sent back to their mobile phones before they enter the pump room. This may allow them to evaluate and put right the issues on site more safely and efficiently. The nature of preventative maintenance using remote monitoring reduces or can prevent unnecessary engineer call-outs. In turn the associated mobilization costs are minimized or saved respectively.

All applications including warehouses, factories, schools and offices can employ and benefit from this concept. Controlled environments, airports, hospitals, power plants and other transmitter free sites can use the device, confident that other or integrated building infrastructures will not be interfered with. Being compliant to CE the product is suitable for integration both on existing/retrofit projects as well as new fire pump installations in the European Union and outside.

FireEye remote monitoring has been designed so that system faults may be identified and corrected in time to prevent damage and even loss of life. A demonstration will be available on the SPP Pumps Ltd stand F15, in Hall 1 at the INTERSCHUTZ international exhibition for rescue, fire prevention, disaster relief, safety and security from the 7th to 12th of June 2010 in Leipzig, Germany. IFP

Please visit www.sppfireeye.com or www.spppumps.com for further information

A Visible Improve

Audibility?

Audible alarms are firmly established as the warning method for fire detection as well as many other types of safety system and yet their effectiveness has always been limited and now appears to be decreasing further due to changes in people's behaviour.

By Bob Choppen

Cooper Fulleon

That may sound like a strange statement to come from someone who works for an organisation that provides literally millions of alarm sounders of many different types every year, but it is I think a fair assessment.

Alarm sounders, or Audible Alarm Devices (AADs) in current parlance, have not changed in their basic function since their conception; that is to make a noise to warn of an emergency. This is in contrast with other elements of safety systems, such as detection technology which constantly advances to provide earlier and more accurate analysis of emergency conditions and has benefitted greatly from developments in electronics and software. So why haven't alarm sounders moved on at the same pace or in the same way? The underlying technology irrefutably has changed and has brought benefits to efficiency and cost, but the basic function remains unchanged. A 50 year old bell would be just as effective as any current sounder. In fact many bells Fulleon still provides are based on designs from the 1970s.

The limiting factor for audible alarms is people, the basic auditory sense is not evolving so the basic technology is locked into providing an acoustic signal covering a small frequency range.

The observation that the effectiveness of audible alarms is diminishing is based on the rapid changes in society and the built environment.

The often casual regard for alarm signals is born out of the sheer number of alarms we endure every day, right from the microwave "ping" to the invariably ignored car alarm and the ever present mobile phone. The difficulty of identifying an important life safety alarm is compounded by the lack of a nationally recognised UK fire alarm signal, so even critical signals can be consigned to the general morass of contemporary noise.

Mobile technology has spawned the "Podestrian" who are estimated to be involved in as many as 10% of minor traffic accidents (Telegraph Oct 2008). The use of music players and mobile phones either masks the noise of approaching traffic or distracts the user to the exclusion of normal safety considerations. While the "Podestrian" is an essentially external manifestation, there are a surprising number of employees using personal music sources to ease the boredom of repetitive jobs and are quite oblivious to their immediate surroundings.

Normal hearing is taken for granted by most of us, but there are estimated to be nearly nine million people who are deaf or hard of hearing of which 700,000 are thought to be severe to profoundly deaf. (RNID 2005). For these people sounders are of little use. In addition, increased concerns over health and safety are encouraging the greater use of ear defenders in the work place and so there is a sizeable contingent of people who work in environments where any alarm sounded is unlikely to be heard over process noise and may also be rendered below a normal hearing threshold even when the noise has stopped because of the hearing protection in use.

Audible alarms are, however, still treated as the most effective alarm method overall; they are cost effective to install and the efficacy of the installed system can be easily assessed with commonly available instruments, but in many situations they do need to be supplemented.

Visual alarm devices

To overcome the issues mentioned above communication needs to be broadened to stimulate

ment

senses other than hearing alone and in 2010 the focus is falling on visual alarms.

Visual Alarm Devices (VADs) have been used to supplement audible alarms for many years either as separate units or integrated with the alarm sounders themselves. The awareness of the need to complement audible alarms has received more attention in recent years, no doubt driven by observance of the requirements of the Disabilities Discrimination Act (DDA).

As the use of visual alarm devices has grown there has been a consequent increase in the loading placed on alarm circuits and Fulleon has responded by producing more efficient visual alarms and also by developing versions of all of its sounders with integrated visual alarms to reduce the power and ease installation requirements.

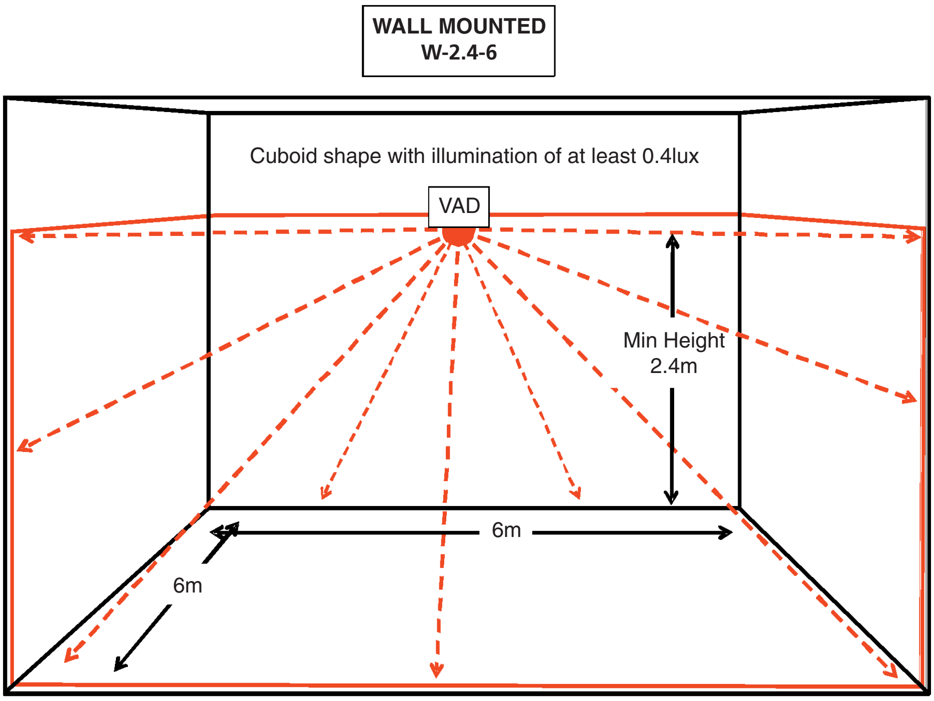
The problem that has been faced by both manufacturers and users is that in Europe there has been no standard method for the measurement of visual alarms or any documents to provide guidance on how to use them within a building. The lack of standards has given rise to manufacturers rating their products in a number of ways, most choosing to use joules, the amount of energy discharged in the flash tube, but this has only a tenuous relationship to the amount of the light produced and nothing to do with where the light goes. Now this has not really mattered as the installers and systems designers had little idea of how bright the visual alarms needed to be, so the criteria for choice often boiled down to power consumption. Aware of the need for a more meaningful comparison of light sources, whether xenon flash tube or LED, Fulleon took the decision to rate all visual alarms by light output, based on testing to the American UL standards and were fortunate to be able to call on the facilities of their sister company Cooper Wheelock for the measurements. This aided comparison between Fulleon products, but did little to allow comparison with competitors or with the decision of what to use in any particular application.

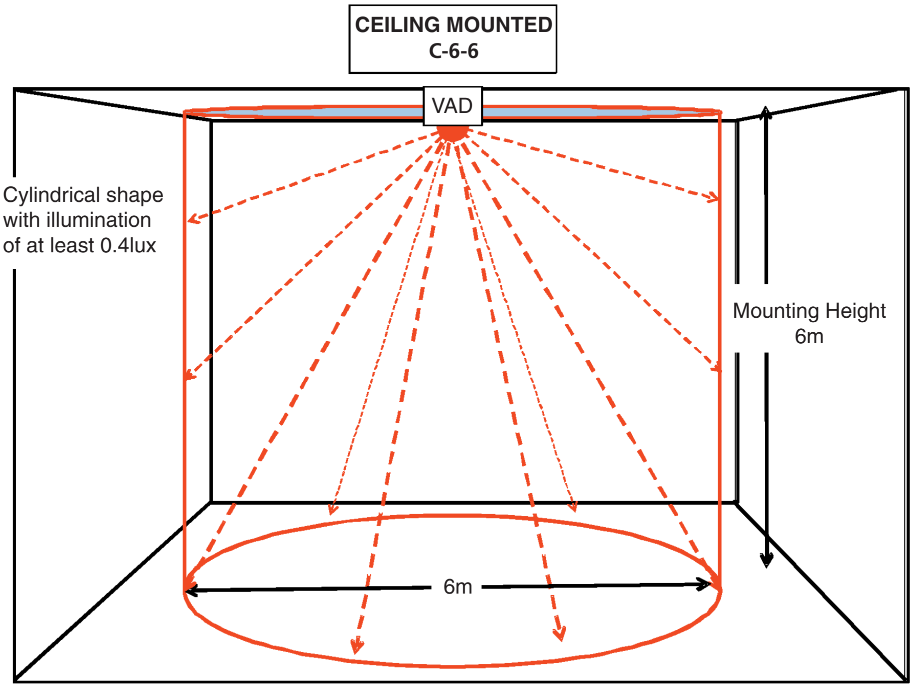
As in any market where there is a requirement, such as the DDA, without any related regulation, there has been much confusion and misinformation in fire industry, some arising through the innocence of ignorance and some intended to exploit that ignorance. Many systems installed with the best intentions may well fall far below the standards required.

Salvation

2010 Will see the introduction of two important documents to the UK. The first: *EN54-23 2010 Fire detection and fire alarm systems – Part 23: Fire alarm devices – Visual alarm devices*, is close to publication, although at the time of writing it is not exactly clear when. This will provide a method of test and classification for VADs, allowing manufacturers to rate their beacons/strobes/VADs in a way that allows the system designer to compare and assess performance and suitability for an application. The second document being prepared is by a joint task group from BRE/LPC and the FIA and is targeted for publication as *LPS 1652 Code of Practice for Visual Alarm Devices used for Fire Warning*, later this year. This document will directly complement EN54-23 and provide guidance on how to use the test data to give effective results in typical situations.

EN54-23 is a parallel to EN54-3 for audible alarms, but differs in that VADs are classified into one of three categories by their intended application. Two of the categories for "Wall" mounted or "Ceiling" mounted products have





specific targets for light distribution patterns, whereas the third category "Open" allows the manufacturer freedom to specify particular characteristics which fall outside of the other two categories.

The area of coverage determined by the testing is based on the distance at which the "required illumination" is achieved, which is 0.4lumens/m^2 on a surface perpendicular to the direction of the light emitted from the VAD.

The Wall and Ceiling classes will require different light dispersion characteristics, the Wall format

requiring the manufacturer to state a mounting height on a wall, minimum 2.4m and the width of a square room over which the VAD will provide coverage. So the data on the beacon could read W-2.4-6, ie mounted at a height of 2.4m the VAD will cover a room 6m square. The VAD will therefore be required to cover a volume; below its mounting height. Any light going upward will be wasted as far as this categorisation is concerned.

Similarly the Ceiling format will be assessed on the diameter of its coverage volume when mounted at a height of 3, 6 or 9m. The VAD in this case needs to radiate more or less equally all around.

The Open class will both allow existing designs to be measured, even if not optimised for wall or Ceiling mounting, or permit a manufacturer to design dispersion characteristics specifically for certain applications, maybe to suit corridors or where mounting heights fall outside those prescribed by the standard.

LPS1652 aims to provide guidance on how the data generated by EN54-23 can be used to plan a system and also fills in many of the considerations absent from the information provided regarding visual alarms in the fire industries bible: *BS 5839-1:2002+A2:2008 Fire detection and fire alarm systems for buildings. Code of practice for system design, installation, commissioning and maintenance.*

A key element of the work that has gone into LPS1652 is the assessment of how effective VADs are in practical situations and how the basic data from EN54-24 can be adjusted to suit variations in viewing conditions within a building. This takes into account both direct and indirect viewing of the light from a visual alarm as well as the effects of ambient light levels in the locality.

An outcome of these two documents is that VADs used with fire systems are likely to need higher light outputs than are currently employed to meet the requirements of the DDA. Low power devices whether xenon or LED based are likely to be effective only in smaller spaces similar to toilet cubicles; larger areas will require higher output devices with consequently higher power requirements

Undoubtedly this will affect the present generation of visual alarms whether and will particularly test the ingenuity of the engineers working on the next iterations of addressable products.

Future considerations

It should be remembered that VADs are only one solution to supplementing audible alarms and that they too have many limitations on their effectiveness which will require more careful planning than for an audible system.

Increased costs to both manufacturers and installers brought by the new standard will encourage the investigation of other alarm methods such as portable tactile devices, mobile phones and so on.

Despite its shortcomings and the changing behaviour of the public there appears to be little on the horizon to displace the audible alarm from its place as the staple for alarm systems. Voice alarm is commonly used to improve information and understanding, but does not help where a sounder is inaudible or masked by other activities. The way forward appears to be more integration between different techniques and may require solutions tailored more specifically to individuals and locations. IFP

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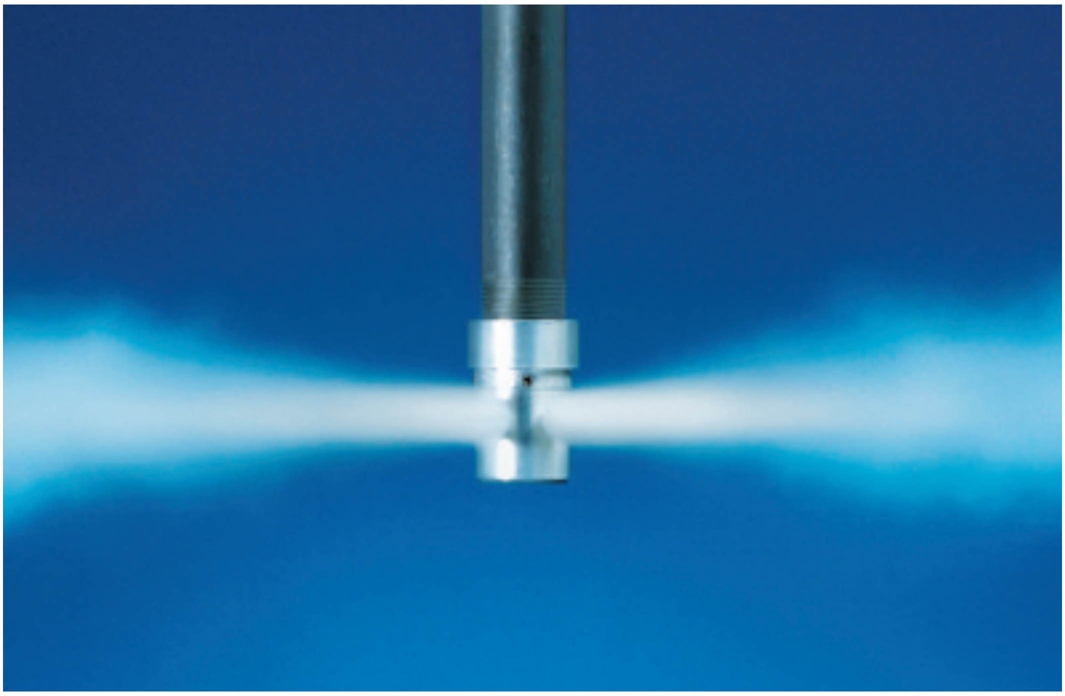

Fire Suppression

With increasing corporate and societal attention on product stewardship and sustainability as part of achieving long-term environmental goals, many companies are looking at ways to improve the environmental profile of their facilities and processes by selecting an environmentally preferred fire suppression solution.

By Alfred Thornton

DuPont Fire Extinguishants

The fire suppression industry has been at the forefront of adopting practices in support of responsible product use since the Montreal Protocol regulations came into effect more than twenty years ago. Industry-driven voluntary codes of practice have helped ensure that the societal benefits of fire suppression agents are maintained while environmental impact is minimized.

It is important to consider all key criteria when choosing a safe, effective and environmentally responsible fire extinguishing system. It would be a mistake to focus on only one aspect of a system, such as the global warming potential or GWP of the extinguishing agent. The reality is that an agent's GWP contributes to climate change only if the agent is released into the atmosphere. Fire suppression industry data indicate that minimal amounts of extinguishing agent are ever released to the atmosphere since most suppression equipment doesn't encounter a fire scenario.

Voluntary codes of practice within the industry have established best practices for installing, maintaining, and servicing fire suppression systems, and these measures have proven highly effective in controlling and reducing unwanted emissions. The industry has also been working closely with the U.S. Environmental Protection Agency (EPA) to develop a reporting program to track fire system emissions, the HFC Emission Estimating Program (HEEP).[1]

In fact, worldwide emissions from fire protection, including fire events, are estimated to represent less than 0.02% of total greenhouse gas emissions on a CO_2 equivalent basis and less than 1% of emissions from the basket of gases manufactured for use.

To put these volumes into further perspective, the average fire system in the U.S. contains about 155 kgs of extinguishing agent, meaning an average system releases about 4.5 mt CO_2 equivalent. According to the U.S. EPA, this release rate equates to the same GWP impact of 9/10ths of a passenger car or [less than half] 4/10ths of your home's annual energy use.[2]

What about the future environmental risk of an ever-growing base of protected facilities? The HEEP data shows emissions from fire systems leveling off, indicating that system emissions are not directly tied to the number of installed fire systems System installations have increased consistently every year over the period of the HEEP data, from 2002 to 2008, yet the volume of emissions from that growing base remains the same. One explanation for this non-intuitive data is that the number of fire and false discharge events is steady, no matter how many sites are protected. Further, the industry currently has a well-established maintenance, recovery and reclamation infrastructure, providing a robust global market for recovering and reusing clean agents in new fire extinguishing systems, recharging existing systems after fires, and removing agents from use through conversion or destruction technologies. Over the years, these maintenance and recovery programs have become more refined and efficient proving that, with proper care and

market incentives, emissions can be reduced, agent and system sustainability can be attained, and environmental responsibility can be realized.

Since clean agent fire systems have a low emission impact, how should an end-user (i.e., facility manager, building owner, and administrator) evaluate and make the best choice in a fire suppression system? Fire suppression systems should be considered as an integral complex system, including, but not limited to, the choice of agent. Just as the science and politics of climate change are complex and interrelated, so too, the choice of the right fire suppression technology for any given application is more than a single component or even sum of components, and requires careful decision making.

First, it is critical to ensure that the performance of the suppression system properly matches the application. Protection of life and health must be the top priority, followed by protection of property and the environment. Selecting a suppression system with the main focus on achieving an arbitrary GWP target not only wastes resources but may ultimately prove to be a worse choice environmentally as well. A high quality system from a recognized manufacturer, carrying an internationally recognized approval (such as Underwriters Laboratory, VdS, or Factory Mutual), helps ensure the system performs as expected, releasing only during a real fire event. Proper service and routine maintenance by trained technicians with respected service firms will enable the suppression system to protect lives and property from fire.

In evaluating the environmental impact of a fire suppression system, it is important to consider the quantity of equipment required, including system storage space, as well as installation and servicing costs. Achieving the same hazard protection goals with physically larger, more complex fire systems can increase a facilities overall environmental impact. Systems utilizing efficient, high performance extinguishing agents such as DuPont™ FM-200® reduce resource requirements, going back to the hardware manufacturing process; they also require less floor space, thus reducing all of the attendant operational costs associated with managing a highly protected risk facility. According to a Data Center News article[3] the operational cost of a U.S. data center ranges from \$80-\$112/ft2; a large part of that cost goes to power and environmental controls. Displacing functional floor space to accommodate a less efficient fire system increases the operational overhead requirements for these facilities and creates an added environmental impact over the lifetime of the installation.

When considering the overall environmental performance of your facility, consider LEED® (Leadership in Energy and Environmental Design) standards. The U.S. Green Building Council (USGBC), a non-profit coalition of building industry leaders, developed LEED® to establish a common standard of measurement for environmentally sustainable building practices. Several clean agent fire extinguishant options contribute toward LEED® credits in the Energy & Atmosphere category, contributing toward USGBC Certification. Money saved by choosing a high performance, cost-effective fire suppression system can be used to upgrade building materials or for other energy performance enhancements. Improvements in these other operational areas are weighted five to ten times more heavily in the LEED® certification process than improvements related to fire systems. Focusing limited resources on areas that provide the greatest return is both fiscally prudent and environmentally responsible.

It is certain that "sustainability" will continue to be a growing concern for critical facilities. Facility managers, building owners, architects and design engineers will continue to review and examine options for improving a site's environmental profile and fire systems are not exempt from that process. By combining a safe, effective fire suppression system that offers the highest performance with an efficient use of space, energy and capital, owners can focus their resources on making a real difference in reducing a company's environmental footprint.

For nearly two decades, HFC clean agents have clearly demonstrated they offer the best balance between performance, economic value, and environmental responsibility for the special hazards fire protection industry. To choose a fire suppression system based solely on the GWP of the agent used in the system is to fail to properly appreciate the true impact and importance of fire extinguishing system in the overall protection and operation of a critical facility. IFP

References

1 Report of the HFC Emissions Estimating Program, March 2010.

2 US EPA Greenhouse Gas Equivalencies Calculator; http://www.epa.gov/RDEE/energy-resources/calculator.html#results

3 Data Center Locations Ranked by Operating Cost, Data Center News, 25 Jul 2006. SearchDataCenter.com

Removal of Fire Extinguishers – is it worth the risk?

In recent years it has not been uncommon to see risk assessments recommending that portable fire extinguishers be removed from the common areas of blocks of flats. This seems an odd recommendation when one bears in mind that there is a plethora of statistics from the UK and Europe that show that portable extinguishers have a life and property saving role to play.

In some cases the removal of portable fire extinguishers appears to have been supported by the local fire brigade at a time when fire safety legislation in the UK has placed the responsibility for fire safety onto the shoulders of building owners and occupiers.

The rationale behind the removal of portable fire extinguishers is the belief that they are a hazard in untrained hands and could encourage people to try to tackle a blaze themselves rather than leaving the building. However in view of the large number of fires that are safely extinguished every year using portable extinguishers, surely it makes more sense to focus on providing training rather than removing what has proven to be very effective means of containing a small fire?

In general fire brigades believe in a “get out, stay out and call the fire service out” approach. However, this advice means that the residents of a block of flats should resist any urge to extinguish a minor waste bin fire in the foyer, activate the alarm, evacuate the entire building and await the arrival of the fire brigade.

This approach appears to be very sensible until you take into account the fact that things are very different in today’s UK fire service as a result of the Fire and Rescue Act in 2004. This act requires that every brigade has an integrated Risk Management Plan which is aimed at the complex problem of balancing its obligations with its resources. The outcome in some parts of the country is that brigades will now not respond to an alarm unless there is “visual confirmation” of a fire. In other cases fire personnel in fourwheel-drive vehicle or on a motorcycle are sent to assess the fire before committing further resources. Also, some stations now have lower manning levels during the night.

The fact of the matter, according to a survey published by the FIA is that portable extinguishers save the British economy alone around £500 million every year and extinguish completely around 66,000 fires. Even these figures may underestimate the role played by portable extinguishers as they are designed to prevent relatively minor incidents becoming major conflagrations, so their use often goes unreported.

In comparison figures from the UK government’s Department of Communities and Local Government that show that the fire and rescue service in the UK attended 88,400 fires in buildings in the UK. Thus the effective use of portable extinguishers is undeniable, and adopting a widespread policy of removing them would place extra strain on the resources of the fire service.

So, shouldn’t we be concentrating on the safe use of portable extinguishers, rather than dismissing them and leaving nothing in their place. In England and Wales, for example, The Regulatory Reform (Fire Safety) Order covers the common areas in such buildings, which means that there is a legal need to appoint a “responsible person”, to ensure that adequate training is provided, and to ensure that residents are aware of the fire safety precautions being implemented in the building. Training in the safe use of portable extinguishers is readily available and inexpensive. Many fire brigades now include information on the selection, placing and use of portable extinguishers on their websites, as well as offering short training courses. In addition reputable suppliers of portable extinguishers also are only too willing to work with a building’s ‘responsible person’ regarding the selection of the most appropriate extinguisher and to help ensure that the legislative requirements are being met.

Any training provided should cover emergency procedures, familiarisation of the building and its escape routes, an understanding of the different types of fire and their likely causes, the different types of portable extinguisher and their safe use, and when not to attempt to use a portable extinguisher to fight a blaze. This may, at first glance, appear to be a somewhat onerous schedule, but most training courses take between a couple of hours for a basic portable extinguisher course, to half-day courses that combine both portable extinguisher training with fire awareness.

Finally the fire sector is becoming ever more aware of the need for third-party certification as the only reliable means of verifying that products genuinely comply with the standard being claimed for them. This is certainly the case with portable fire extinguishers and end users should be encouraged to put their faith only in portables that are maintained by installers that can prove their competence by membership of a third party certification scheme such as those run by BAFE and LPCB. IFP

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Industrial Flame Detection – the 'pros and cons'

Optical flame detection has progressed to meet the ever-growing demands for maximum reliability, availability and minimal false alarm events and is widely employed in many high risk industries, such as those in oil & gas (onshore & offshore), petrochemicals, hazardous material handling and storage, etc., to protect both high-value plant and personnel.

By Ian Buchanan

European Manager, Spectrex Inc

Flame Detectors are the favored solution for high risk areas and outdoors where smoke and heat detectors are not effective. Unlike smoke and heat detectors, the fire/products of fire (smoke/heat) do not have to reach the optical detector to be recognized as it can 'sees the fire (flame) radiation from distances up to 65 meters, within a 100º 'cone of vision' in all directions – and raise an alarm within 5 seconds. Detection is taken to the fire rather than waiting for the fire to reach the detector.

Optical flame detectors provide the fastest detection of a fuel fire in the early ignition stage.

About flames

Flames emit electromagnetic radiation at a wide range of wavelengths, which vary depending on the fuel being burned and environmental conditions that affect the radiation transmission in the atmosphere. Optical flame detectors operate by sensing one or more of these wavelengths. (Fig. 1)

Many combustible materials include carbon, and combustion of such hydrocarbon fuels, typically generate hot carbon dioxide (CO_2) gas. Hot CO_2 has a characteristic infrared (IR) emission spectrum, with a relatively strong and well-defined peak at wavelengths from approximately 4.2 to 4.5 microns, and relatively little intensity at wavelengths immediately on either side of the peak. In the presence of an actual fire, the radiation intensity in the peak band is generally high, while little or no radiation is received in the side bands. Thus, high radiation intensity in the peak band as compared to that in the non-peak side bands is used to determine whether a flame is present.

Some other combustibles lack carbon, for example hydrogen, ammonia, metal oxides, silane and other non-organic fuels. In their combustion process, they generate a lot of hot water vapor that has a characteristic IR emission spectrum with a relatively strong peak around 2.7 microns.

One of the problems in detecting fire conditions, particularly small fires or at long range, is the potential for a high false alarm rate. Such spurious radia-

40/40 plus

tion sources might not be large enough to activate short-range detectors, but may activate detectors whose sensitivity has been increased to maximize their detection distance. A false alarm may result in a costly discharge of the fire extinguisher and its replacement and/or plant shutdown.

Several generations of flame detectors have been developed over the years to address the various fire and explosion hazards, particularly in today's high-risk industries.

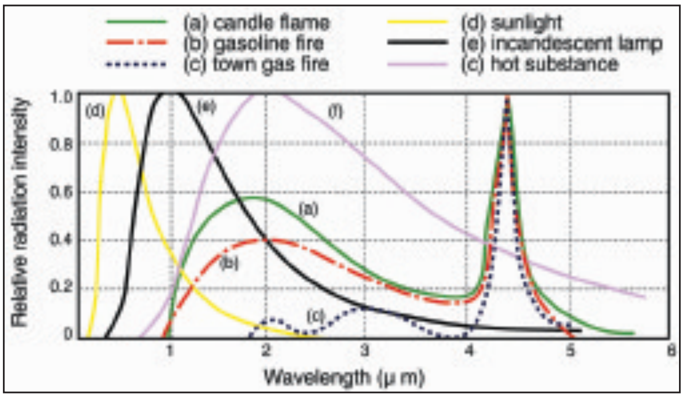


Figure 1

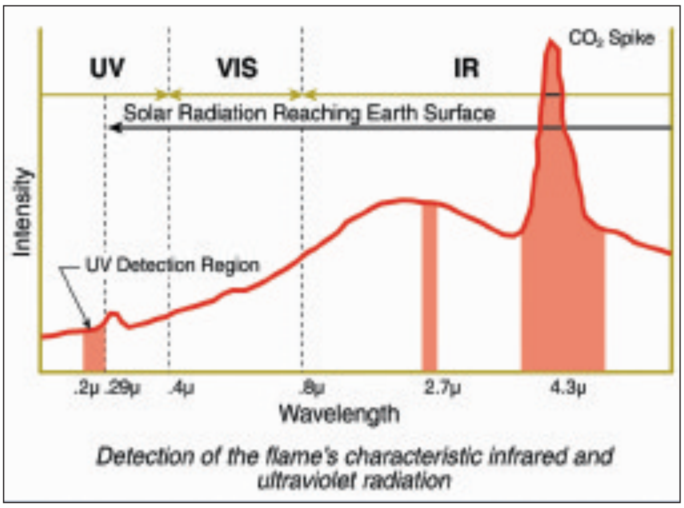


Figure 2

Flame detection technologies

Flame Detectors usually employ several optical sensors, working in specific spectral ranges that detect simultaneously the incoming radiation at the selected wavelengths. These signals are analyzed in one or more of the following ways:

1 Comparator techniques (and-gate techniques).
2 Flickering frequency analysis.
3 Threshold energy signal comparison.
4 Mathematical ratios and correlations between various signals.
5 Correlation to memorized spectral analysis.

Modern Flame Detectors employ several of the above-mentioned techniques using multiple sensors to provide enhanced reliability and accuracy. The spectral bands selected for each type of detector determine the detector's sensitivity, detection range, speed of response and immunity to false alarms. The flame radiation spectral pattern, being unique, allows several spectral ranges to be employed simultaneously in the various detection devices.

The following, in chronological order, is a brief review of the technologies, their limitations and the solutions that have been developed and incorporated into modern flame detectors. All are still in use today although early types tend to be restricted to very specific applications.

UV flame detection – single sensor

The earliest flame detector utilized the UV spectral signature of some flames which have a pattern that can be readily recognized over the background radiation. UV flame detectors detect flames at high speed (3-4 milliseconds) due to the high-energy UV radiation emitted by fires and explosions. However, the UV flame radiation can be attenuated by atmospheric pollutants. In addition, false alarms can result from random UV radiation from stimuli such as lighting, arc welding and radiation, X-rays, solar radiation (not absorbed by the atmosphere).

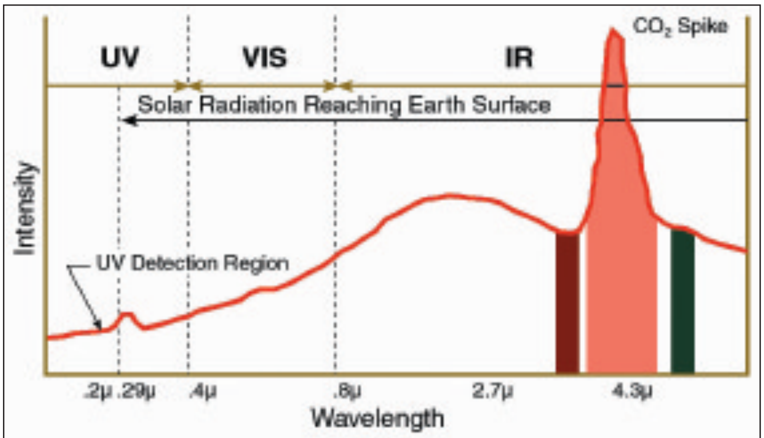
The latest generation of UV detectors are more reliable but still susceptible to false alarms and limited to approx 15m detection distance. They tend to be used indoors where interfering radiation is not present and where very fast response is necessary, e.g. munitions manufacture.

IR flame detection – single sensor

IR radiation is present in most flames. However, flames are not the only source of IR radiation, in fact, any hot surface emits IR radiation that coincides with flame IR radiation wavelengths.

Most single band IR detectors are based on pyroelectric sensors with a 4.4 micron (m) optical filter and a low frequency (1-10 Hz) electronic band pass filter. This type of detector will recognize a 1 sq.ft. Gasoline pan fire from a distance of 15m.

Figure 3



Detection of the flame's characteristic CO_2 emission line by the use of three wavelength bands

However, these IR detectors are still subject to false alarms caused by blackbody radiation (heaters, incandescent lamps, halogen lamps, etc.).

UV/IR flame detection – dual sensor

Dual spectrum UV/IR technology employs a solar blind UV sensor with a high signal-to-noise ratio and a narrow band IR sensor. The UV sensor itself is a good fire detector but easily false alarms. Thus, the IR sensing channel was added, working at the 2.7m or the 4.1m–4.6m spectral ranges and serve as a reliable detector for many mid-range applications. (Fig. 2)

However, even this advanced technology has its limitations, since each type of fire has its own specific ratio of UV to IR output. Hence, specific dual UV/IR detectors must combine both signals and compare them to distinguish a fire signature from false alarm stimuli.

To ensure reliability, a discriminating circuit compares the UV and IR thresholds, their ratio as well as their flickering mode. Only when all parameters satisfy the detection algorithm is a fire signal alarm confirmed. However, UV radiating sources are sources for false alarms.

Since false alarms can affect both UV and IR channels, certain scenarios may occur when a fire is present. Unwanted solar spikes in the UV combined with flickering IR sources (such as moving objects in front of hot sources) are liable to cause false alarms, even when a fire is not present.

Again, detection distance is limited to max 15m.

IR/IR flame detection – dual sensor

More recently, the fire's main IR spectral characteristic feature at 4.3m–4.5m is analyzed thoroughly. This "differential spectral" approach is where two spectral ranges are analyzed: one emitted strongly by the fire, while the second is emitted weakly by the surroundings, thus the ratio gives a substantial mathematical tool for fire signal processing.

However, since most dual IR detectors use the 4.3m sensor as their main channel for fire recognition, they suffer from atmospheric attenuation, especially at long range detection applications. Again, detection distance is limited to max 15m.

Triple infrared (IR3) flame detection

TRIPLE IR (IR3) technology is a major breakthrough in fire detection, which detects by concurrently monitoring with three IR sensors.These signals are further analyzed mathematically with respect to their ratios and correlations.

IR3 detectors will not false alarm to any continuous, modulated or pulsating radiation sources other than fire (including sources like black or gray body radiation). The high sensitivity of the Triple IR technology, coupled with its inherent immunity to false alarms, enables another major benefit of this technology – substantially longer detection ranges than previously obtained with standard detectors – 65m compared to 15m for the same test fire. (Fig. 3)

Multispectral flame detection

A major concern in optical flame detection is IR radiation with spectra, at least superficially, similar to those emitted by flames, which may be produced by many non-flame sources, including warm objects, sunlight and various forms of artificial lighting. Such IR radiation may be misinterpreted as a flame. However, simply ignoring or filtering this radiation may result in actual flames being masked.

Analyzing multiple spectral bands, identifying the absence of a strong peak, eliminating spectra resembling a blackbody curve, employing wide band and narrow band filters, are some of the modern 'tools' in flame detection.

Multiple IR sensors is the best technology, provided the selection of sensors and filters covers most of the flammables spectra (including hydrocarbons and hydrogen flames) and eliminates all the false alarm spectra in the monitored area. Such detectors can simultaneously detect a hydrocarbon fire at 65m *and* a hydrogen flame at 30m.

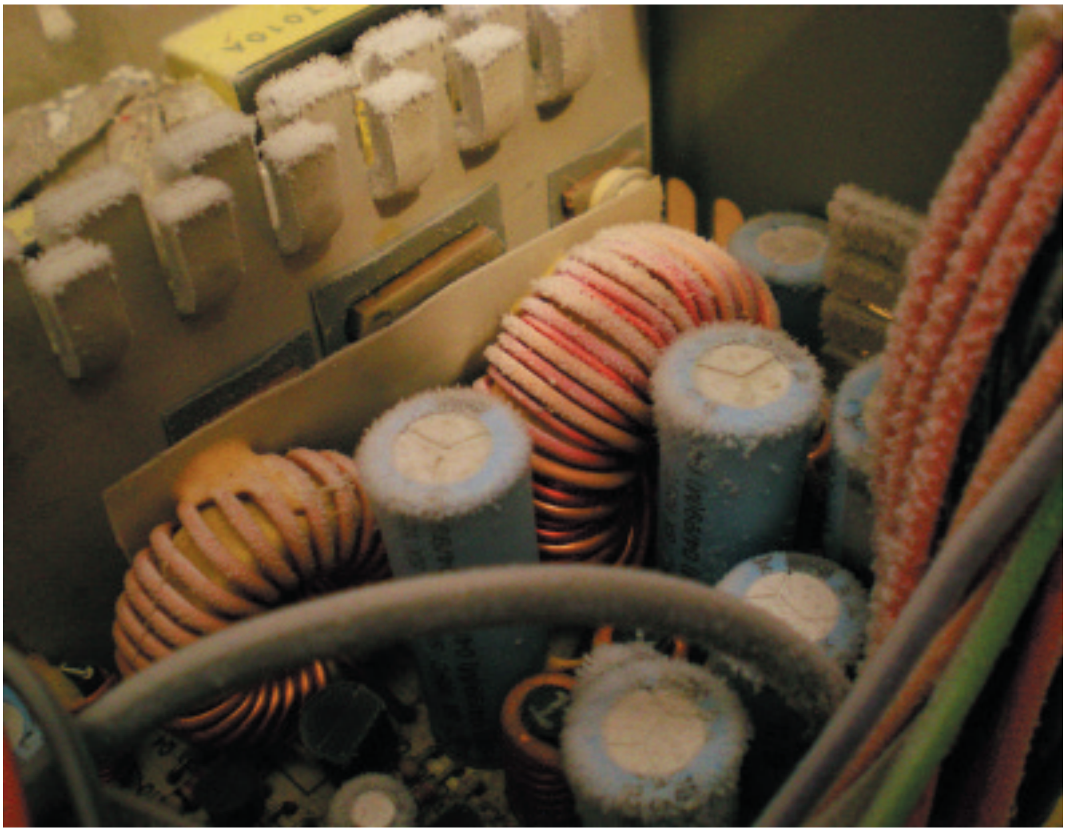
The increased activity in LNG and LPG processing and storage also requires the use of flame detectors, and recent improvements in the effective detection range for such gas type flames (e.g. methane, propane, etc.) means that fewer detectors are required to properly protect any given area than was previously the case.

Due to the increased reliability, durability, high quality and performance, Spectrex 40/40 Series Flame Detectors are approved to SIL2 (TUV) for safety integrity; performance approved to EN54-10 and FM3260 as well as Ex Zone 1 hazardous area approved with a resultant extension in the warranty period to 5 years.

Summary

Flame detection technologies have advanced significantly since the first UV detector, primarily 'pushed' by the ever-growing demands of modern industries for reliable and cost-effective detection equipment for their expensive high-risk facilities and processes. Smaller in size, larger in brains, modern optical flame detectors provide enhanced flame detection reliability and longer detection ranges with minimal (or no) false alarms, backed by independent confirmation of their performance and integrity. IFP

Protecting Electri
with CO_2 is a high



Using CO_2 to protect electrical cabinets and enclosures risks doing considerable and expensive damage to the very equipment it is seeking to protect. Nick Grant explains.

By Nick Grant

EMEA Vice President and General Manager of Firetrace International

For the past 100 years or so, CO_2 has been successfully extinguishing fires and continues to this day to be a popular, versatile and effective fire suppression agent. Frequently, the only detracting consideration has been that it is not suitable for the protection of areas where people might be present, as its discharge in fire extinguishing concentrations would be lethal to room occupants.

However, while the full-room total flooding discharge of CO_2 can be used without damaging electrical equipment, this does not mean that CO_2 is suitable for every electrical environment. This is because the CO_2 discharge nozzles in a room are typically some distance from the sensitive electronics. This is not the case with direct-discharge, tube-operated systems in enclosed electrical cabinets, where the CO_2 discharge may be a matter of only a few centimetres away from delicate circuit boards or microchips.

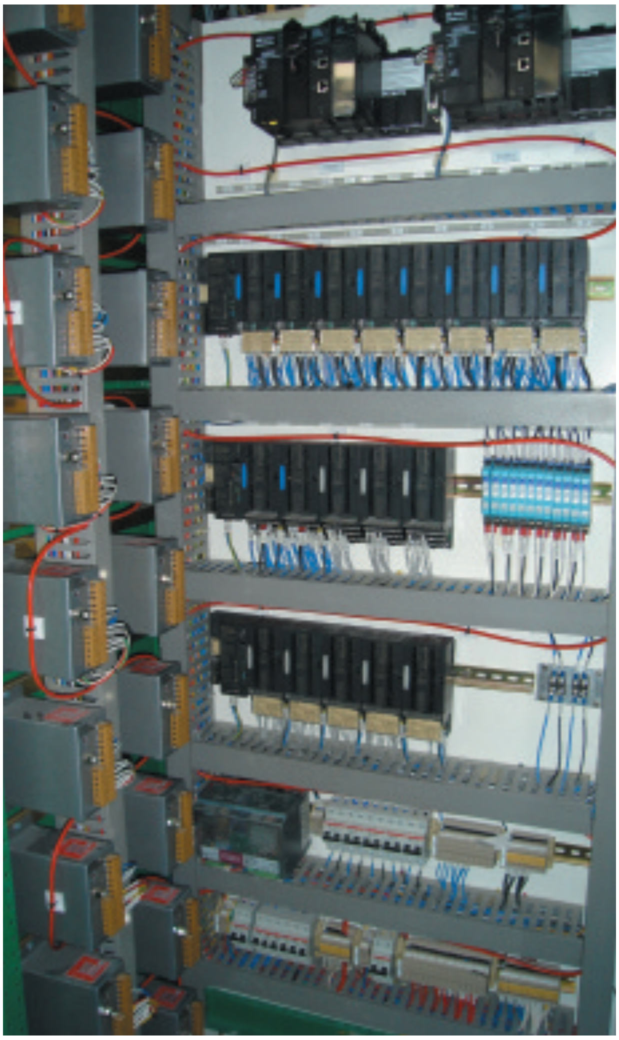
This has the potential to adversely impact on a vast number of businesses where electrical cabinets and enclosures maintain and control an array of business-critical processes – machinery control cabinets, switchgear, substations or simple fuse boxes – and where the loss or damage of the equipment could have devastating consequences.

In these applications, the direct-discharged CO_2 suppressant agent is released in liquid form that transmutes instantly into a gas, reducing the temperature to a super-cooled –70°C. This instantly freezes the humidity throughout the cabinet and effectively transforms the electrical panels into "snow boxes". This "snow" is a mixture of frozen carbon dioxide – often called dry ice – and water that can also collect dust and dirt particles from inside the cabinet. This "snow" melts into water inside the panels and then comes into contact with the energised components. The dust particles that are collected within the snow are deposited on to surfaces inside the enclosure, creating an electrically conductive substrate.

The rapid cooling from ambient temperature to –70°C can also damage sensitive electronic components through a process known as thermal shock, which can damage some – possibly all – of

cal Cabinets
risk option

the equipment in the cabinet. Also, there are still direct-discharged CO_2 systems on the market that discharge the CO_2 as a gas, rather than as a liquid that then transmutes into a gas, where on discharge so much frost is formed that the cylinder valve freezes up and discharges only a portion of the cylinder's contents. Estimates suggest that this may be as low as 50 percent. This serious drawback has though been overcome in ISO9001: 2008-certified Firetrace International FIRETRACE® automatic fire suppression systems by the innovative development of a modified direct/indirect valve.



However, when the CO_2 transmutes from a liquid to a gas it expands at a rate of 500:1. This sudden expansion in volume creates a significant over pressurisation that can also seriously harm sealed enclosures and deform metal panels. The result is that, while the fire in the cabinet is suppressed, the damage caused to nearby electrical equipment by choosing to use direct-discharged CO_2 is likely to be extensive.

This might, of course, beg the question: "Is it necessary to protect electrical cabinets with this type of dedicated fire suppression?" The answer is an unequivocal "yes". Reliance on facility-wide systems, even with the most sophisticated and integrated installations, is seriously flawed because, by the time a ceiling-mounted smoke, heat or flame sensor or a beam detector has been activated by a fire in an electrical cabinet, it is all but certain to be extensively damaged if not destroyed. By their very nature, enclosed micro environments are isolated from the facility's main fire detection and alarm installation and firefighting facilities.

Any energised equipment – both low voltage and high voltage – can catch fire. Typically, fires in electrical cabinets are caused by loose connections and faulty cables that, when power is running through them, the electricity can arc. This arced electricity is extremely hot and can cause the cable sheathing to burn and spread to other components. It is therefore essential for the fire detection and suppression to be targeted on the connections and components, such as switches and transformers.

So, what suppressants are suitable for electrical cabinets? While there are any number of agents that can be trusted to suppress a fire, not all can be relied upon not to damage the electrical cabinet they are endeavouring to protect. Certainly not CO_2.

Unlike CO_2, properly designed systems with agents such as DuPont FM-200® and 3M™Novec™1230 Fire Protection Fluid discharge at much higher temperatures and have proven to provide fast and reliable suppression without the detrimental side effects of direct-discharged CO_2. Both FM-200 and Novec 1230 are non-conductive, clean suppression agents and, significantly, neither has either the huge temperature change from ambient, or the huge pressure change from ambient that precludes CO_2 from being suitable for these applications.

Novec 1230, for example, exists as a liquid at room temperature. It is stored as a low-vapour-pressure fluid that, when discharged, transmutes into a colourless and odourless gas, using a concentration of the fluid that is well below the agent's saturation or condensation level. Both agents have been used extensively by Firetrace International in its FIRETRACE systems, of which there are now more than 150,000 installations around the world.

Both agents are also approved by UL [Under-

writers Laboratories] and FM [Factory Mutual] and are listed in the appropriate codes and standards, such as NFPA 2001 [Standard on Clean Agent Fire Extinguishing Systems] and BS EN 15004:2008 [Fixed firefighting systems. Gas extinguishing systems].

FIRETRACE provides reliable, around-the-clock, unsupervised protection; it is self-activating, which means it needs neither electricity nor external power. It also requires neither manual activation nor monitoring, virtually no maintenance, and can be fitted as a new-build installation or retrofitted to existing micro-environments in a matter of hours. A FIRETRACE installation does not affect the IP ingress protection rating of the cabinet or any internal enclosures, as it does not necessitate the drilling of holes. It also does not involve the introduction of any electrically conductive hardware.

It is the only UL [Underwriters Laboratories] listed, FM [Factory Mutual] approved and CE [Conformité Européene or European Conformity] marked tube-operated system in the world that is tested as an automatic fire detection and suppression system with, globally, 150,000 successfully completed installations.

Briefly, the system comprises an extinguishing agent cylinder that is attached to technically-advanced proprietary Firetrace Detection Tubing via a custom-engineered valve. This leak-resistant polymer tubing is a linear pneumatic heat and flame detector that is designed to deliver the desired temperature-sensitive detection and delivery characteristics. It can be routed throughout an electrical cabinet and, when the tubing is exposed to heat and radiant energy from a fire, it ruptures instantly and immediately directs the suppression agent at the source of the fire.

In addition to FM-200 and Novec 1230, FIRETRACE systems also use ABC dry chemical agents and AFFF [Aqueous Film Forming Foam] concentrate. In appropriate cases, CO_2 is the chosen suppressant, but certainly not when it comes to electrical cabinets. IFP

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Nick Grant is EMEA Vice President and General Manager of Firetrace International. He is based at the company's EMEA head office is in the UK and can be contacted on +44 (0) 1293 780390 or via email at grant@firetrace.com

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† Listings and Approvals vary by system and agent.

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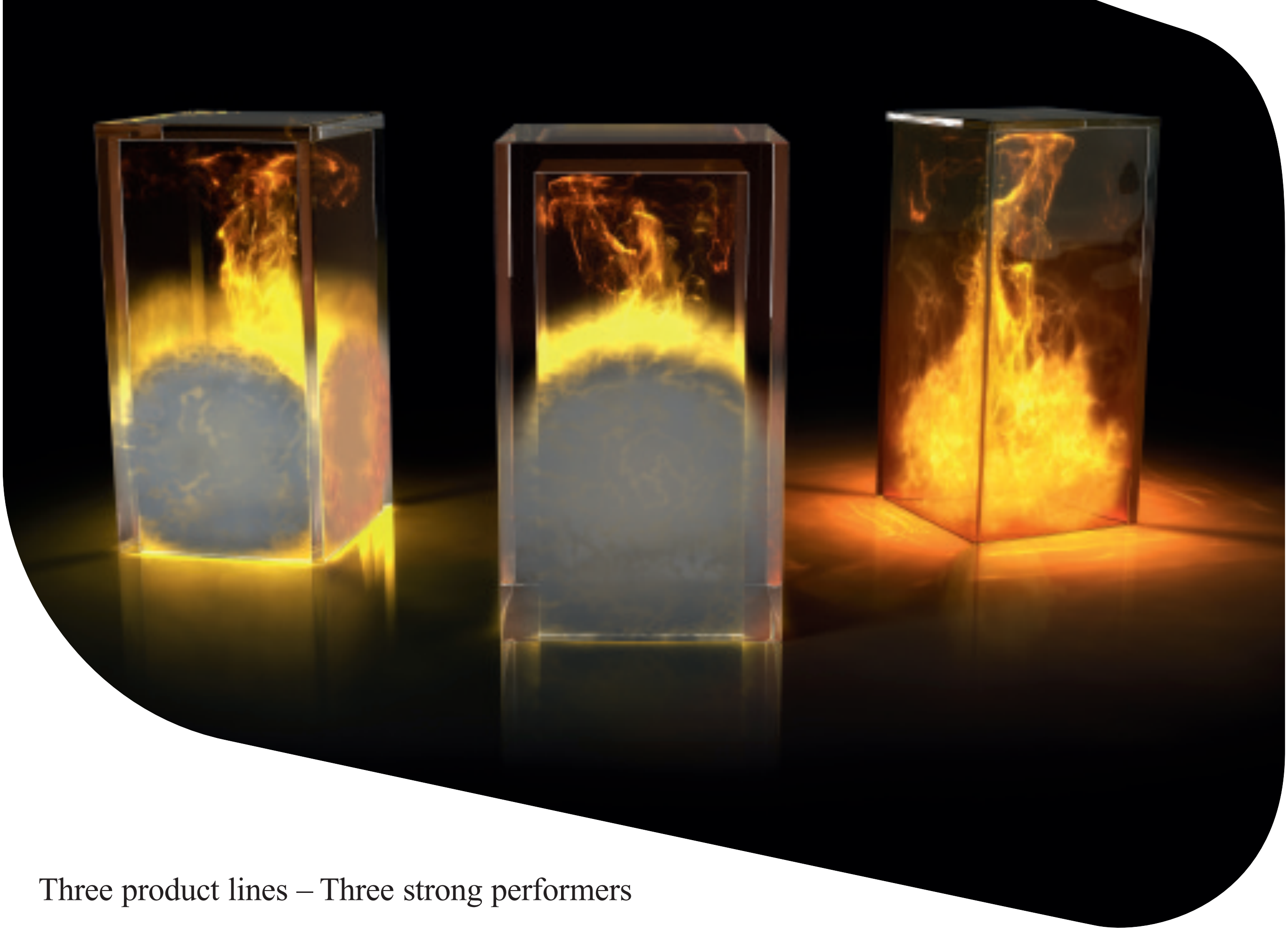

Three product lines – Three strong performers

The primary function of any fire-resistant glass is to consistently, reliably and uncompromisingly protect lives and properties in various applications and situations. Pilkington offers a comprehensive range of products for specific requirements and types of risk:

- Pilkington **Pyrostop**® – well-proven with its high performance providing full thermal insulation as well as integrity (EI)
- Pilkington **Pyrodur**® – a barrier to smoke, flames and hot gases effectively reducing the level of dangerous radiant heat (EW)
- Pilkington **Pyroclear**® – the clear choice for consistent and reliable basic integrity performance (E)

It is the unrivalled range of fully tested and approved fire-resistant framing solutions available for the product lines in combination with additional functional properties which contributes – to a substantial degree – towards facilitating safer as well as space giving, brighter and cost-effective fire safety design. Pilkington fire-resistant glass is fit for purpose – a sure choice!

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Testing times

Advances in fire safety design now include a significant element of risk assessment as a supplement, or an alternative, to prescriptive rules. There are major implications as a result.

By Mike Wood

Head of Fire Protection (Glass & Glazing Design), Pilkington UK

Product reliability and fitness for purpose become key considerations, and manufacturers have to give more consideration to the reproducibility of product performance in realistic and alternative fire scenarios. A risk-based approach requires confidence in product performance, linked to assurance on the reliability of product function. That requires more attention to the range and validity of furnace test data as evidence for product capability in fire.

Best practice principles

The successful application of fire-resistant glass is based on three core factors:

- the development of fire-resistant glass technologies with reliable and effective function, for use in the wide range of fire environments that may be possible;
- repeat furnace testing of fire-resistant glass, in as many different furnaces around the world as possible to demonstrate consistency of behaviour and effective fire protection function; and
- testing in as wide a variety of different glazed system applications and framing options as feasible to provide the maximum of specifier choice.

These best practice principles for fire-resistant glass need to be recognized and reinforced. Innovations in architecture and construction continue to set challenges, and fire safety is even more in the spotlight. Pilkington continues to be at the forefront of developments. Advances maintain reliable effective fire protection whilst expanding the variety and capability of applications. Fires in modern buildings can be intense and the course of fire growth characteristically unpredictable. The

underlying fire-resistant technology for glass products therefore has to be inherently safe and reliable, requiring a significant technical input.

Implications of risk

Risk-based approaches lead to focus on scope of application, product sensitivities, failure mechanisms and limits in fire. At issue are both the level and validation of product performance. Both are not easily satisfied by reference to a single passed fire test, least of all by an assessment that may be tenuously balanced on scanty test evidence.

Development of risk-based techniques calls for a greater focus on the depth and spread of test evidence, not less. Wider consideration of real fire conditions, in what could be a range of possible fire scenarios and a variety of fire safety objectives, is increasing in fire safety design. The uncertainties and risks of fire are well known. Deduction of expected performance in real fire conditions is a projection from test evidence involving an element of uncertainty. The further the claimed performance strays from the underlying test evidence, and the weaker that evidence is, then the greater are the potential uncertainties in predicting fire behaviour. The degree of uncertainty can effectively be minimized by increasing as much as possible the scope and range of available test evidence as a testament to product reliability, consistency and effectiveness.

Furnace testing

The prime purpose of a standard test is to allow product classification according to broad functional categories which are defined by prescriptive pass/fail criteria. A base of standard test evidence is essential. But, the prescriptive process is not ideally suited to provide the type of information required by a risk-based approach to design. The test evidence therefore needs to be as extensive as possible, to maximise the information content for the designer.

Assurance on repeatability and reproducibility of performance can best be provided by a demonstrated track record of testing – as many tests in as many different test furnaces and framing situations as possible, backed up by large scale tests and real fire experience. Such considerations can hardly be answered by a single test, or a limited scope of test evidence. In the approval process, test failures are not recorded, and no distinction is made between a product that just scrapes through by less than a minute and one that can achieve a safety margin of several minutes.

Test evidence is crucial, but the information should not be stretched beyond its point of applicability and relevance, at the risk of becoming misleading and unrepresentative. Scrutiny of the evidence should cover applicability, scope, relevance and validity. The designer also has to note the expected fire situation. There are some key points to be mindful of:

- Fire-resistant products should only be installed as part of an approved and tested fire-resistant system of matched components. There should be no short cuts, such as mixing and matching of components, or using a system based on incorrect test evidence. Different glasses made

by different manufacturers should not be presumed to be equivalent..

- The product tested must always be representative of the routine product coming off the production line. And if that product changes, or varies, in a way that could compromise the submitted test evidence then controls must be put in place and the product re-tested.
- There are limitations on furnace test information. A proviso included in fire resistance test reports is that a test result only relates to the behaviour of the element of construction under the particular conditions of the standard classification test.
- Test reports remind users that the result applies only to the specimen as tested, also that the result is not intended to be the sole criteria for assessing potential fire performance of the element in use, nor to reflect actual behaviour in fires. Time in a standard test does not necessarily directly correlate with time in a fire, under fire conditions that may well vary significantly from those of the prescriptive test.
- The fire test evidence must be relevant and applicable to the application and the function of the fire-resistant glazed system. For example, a test report for overhead glazing is totally inadequate as evidence for a fire-resistant loadbearing glass floor (on the presumption that any horizontal glazing test will do).

Practical limits

Even relatively low levels of radiant heat can cause serious burns and smoking on the protected side, perhaps secondary ignition. Radiant heat absorption by a glass can also give high surface temperatures on the protected side, leading through convection to a high temperature environment on the protected side.

The UK's Building Research Establishment (BRE) guide safety limit for human tenability is 2.5 kW/sqm. That is within the range of insulation glass, but not integrity EW (limit 15 kW/sqm). There is a tendency to pass off the EW class, in some way, as a substitute for insulation. In practice, there is no comparison. The 15kW/sqm limit represents a high level of intolerable heat, and it is of questionable fire safety benefit.

Insulation on the other hand provides protection against all heat transfer, defined by precise temperature criteria. Insulation performance therefore effectively protects against the risk of serious burns, for enhanced life safety (especially for vulnerable groups) as well as benefits in providing containment and limiting fire spread.

Assessments

Assessments provide an opinion on performance were the product to be tested. Assessments are generally used to support minor variations in the product as originally tested They should not be used *in lieu* of fire tests, although this is a developing trend of suspect practice which requires careful scrutiny since the supporting test evidence can be tenuous. Assessments should be withdrawn when tests show the opinion to be mistaken.

If assessments are used to support a product claim, then it is absolutely important that they are based on valid and applicable primary test evidence which is owned by the assessment owner and approved for use. If specific test evidence of this validity is not referenced then the assessment should be dismissed. Above all, assessments must be carried out by properly accredited authorities with experience of testing and the fire-resistant glass in consideration (e.g. a notified body accredited to BS EN ISO/IEC 17025:2005, General criteria for the competence of testing and calibration laboratories).

Test evidence is crucial, but the information should not be stretched beyond its point of applicability and relevance, at the risk of becoming misleading and unrepresentative. Scrutiny of the evidence should cover applicability, scope, relevance and validity. The designer also has to note the expected fire situation.

Fire resistance

Applicable fire resistance classes are either integrity (i.e. holding back flames and hot gases) or insulation (i.e. the limitation of heat transfer by all mechanisms, plus integrity). Integrity (EN classes E and EW) refers to the prime performance as a physical barrier to flames, fumes and hot gases. Insulation refers to the ability of the fire-resistant system to act both as a physical and a heat barrier (EN class EI). The insulation function is unambiguously evaluated by measuring the surface temperature of the test panel. Insulation effectively reduces the risk of dangerous heat transmission for the fire, by all transfer mechanisms.

The differences between the performance categories must not be blurred. For example, interpretation of the European EW class (integrity radiant heat) can be ambiguous. The EW radiant heat limit – less than 15 kW/sqm at a 1m distance – is not recognised by UK regulations. Radiation is determined by pane size, orientation and distance, as well as the intensity of the source fire. The level of radiant heat from a glass, even under standard test, therefore varies according to the situation. As a result, a single measurement cannot be taken as a characteristic material value.

Fire-resistant glass floors

The development of fire-resistant integral loaded glass floors is one of the best examples of the capability of intumescent fire-resistant glass based on co-operation between manufacturers and specialist systems developers.

Pilkington has worked closely with specialists

Glazeguard to develop a robust fully tested loadbearing fire-resistant glass floor system. Glazeguard's Triple-Lite™ Firefloor is at the forefront of transparent building design. It is the first fire-resistant glass floor system to attain the CE mark under standards EN 14449 (Glass in Building: laminated and laminated safety glass) and EN1365-2:2000, (Fire resistance tests for loadbearing elements – Part 2: Floors and Roofs). The test load has to be appropriate for the type of activity and occupancy characteristic. In the UK, guidance comes from standard BS 6399-1:1996, Loading for buildings – Part 1: Code of practice for dead and imposed loads.

Triple-Lite™ has shown fire resistance insulation and integrity for over one hour for both integrity and insulation when fully loaded under test fire conditions. The floor structure has demonstrated robust stability in several tests. Triple-Lite™ is available in individual panel areas 3m by 1m standard single panels for construction of glazed floor areas or glazed transit air bridges. Both timber and steel framing are approved. Major applications already include a range of situations. Major projects completed and in progress illustrate the value engineering benefit of a complete approach from design through to installation. Applications are in a wide range of diverse situations, including health care, commercial, education, and even domestic buildings (e.g. Rolls House, a commercial and court building in Fetter lane, London; United House, West St London, a commercial development; Dublin dental hospital; and private domestic installations in flats and houses).

The fire-resistant backbone of Triple-Lite™ is provided by Pilkington Pyrostop® 60-101, a well tried and tested insulation with integrity fire-resistant glass classified for 60 minutes. Not only does Pilkington Pyrostop® 60-101 have an extensive furnace test record around the world. It also has demonstrated fire performance in the major Center Parcs Elvedon Forest fire (2002) when the product had to survive severe fire exposure for more than seven hours – which it did comfortably, effectively stopping the fire in its tracks and protecting the heart of the site.

Fitness for purpose

The current widespread application of fire-resistant glass is fundamentally dependant on the application of best practice principles in furnace testing linked to systems development. Tragic headline fires involving fatalities serve to remind everybody of the risks and unpredictable nature of fire. The costs of fire are rising not falling. And the focus on fitness for purpose of products and constructions is accordingly getting sharper.

Against the background of fire risks, those principles of furnace testing need to be emphasized, rather than eroded. That is critical if the use of fire-resistant glazing is to keep in touch with advancing design. IFP

Pilkington Pyrostop, Pilkington Pyrodur, and Pilkington Pyrodur Plus are extensively tested fire-resistant glass types based on an established resilient intumescent interlayer technology. They are available in an extensive portfolio of framing systems, and are capable of fulfilling the range of fire safety demands from regulations and risk-based design. The record of use includes major buildings across the world in a range of challenging situations for glass. For more information on Pilkington call 01744 69 2000 or visit www.pilkington.co.uk/fireresistant

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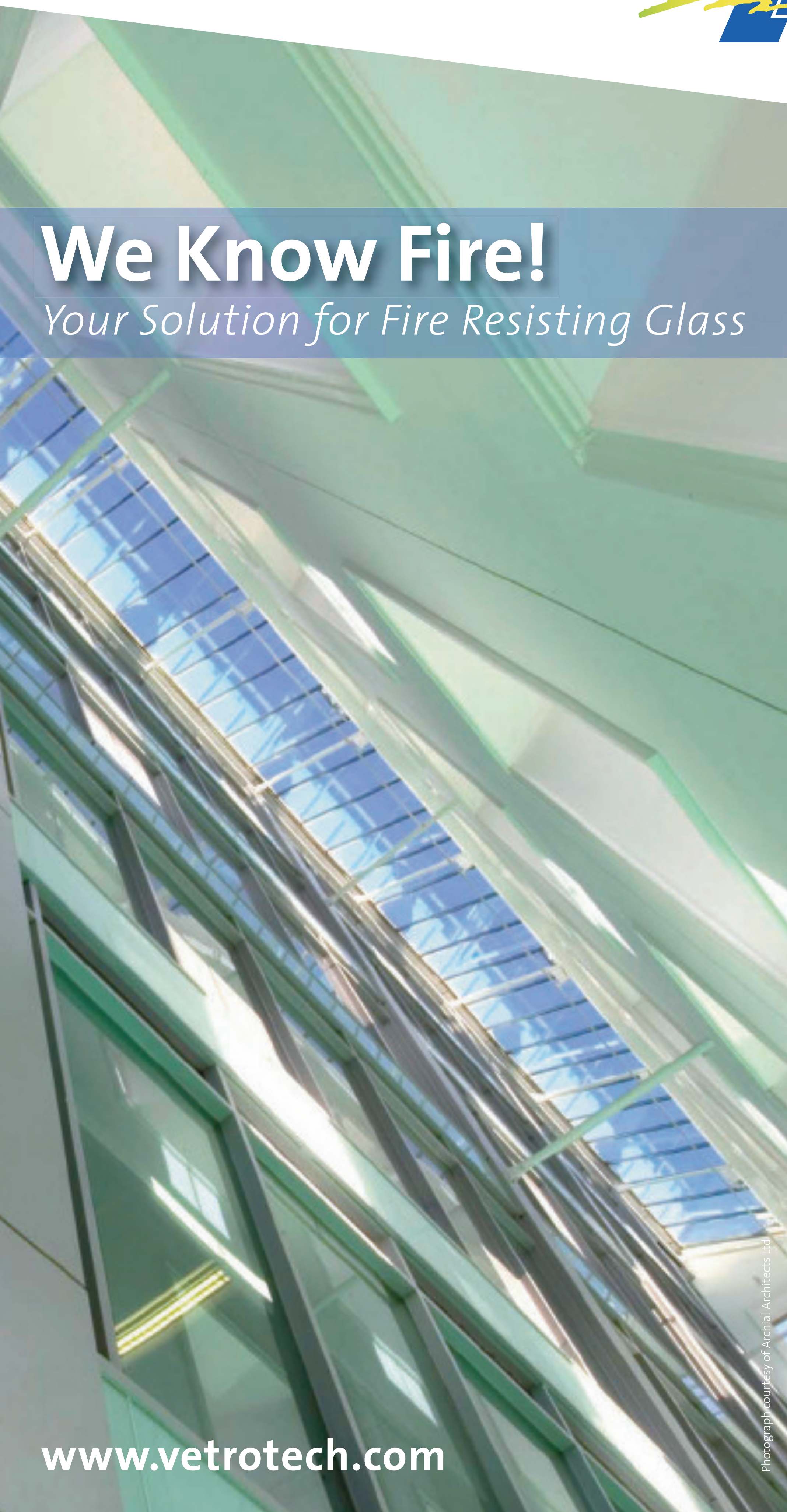

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Fire Rated Duct

Fire rated enclosure of duct located in exit passageway, protected with flexible wrap

Shaft Alternative for Air Distribution Systems (ADS)

By Sarah Brewer

Group Product Manager, Unifrax I LLC

Fire rated duct enclosures are increasingly being accepted as a shaft alternative for air distribution systems (ADS) by design professionals and code officials.

Shaft alternatives, such as ducts protected with flexible fire rated duct wrap, provide solutions for better building space utilization and physical access to air control equipment. Listed and Labeled systems verify performance when tested under duct application conditions and provide documentation necessary for code compliance. The benefits of these systems can help resolve current project issues and offer potential future building design options.

ADS ducts function under operational and emergency conditions

Multi-story commercial and residential buildings must utilize a variety of air distribution systems (ADS) to provide the necessary heating, cooling, and ventilating functions required to provide occupants with a tenable environment. These systems must meet minimum standards of performance and fire safety set by the building code for both normal operating conditions and emergency fire situations. This is accomplished through a combination of code prescribed passive fire resistant building construction and active smoke control systems.

Fire rated duct requirements, challenges and benefits

Innovative design, retrofit occupancy changes and the push to achieve greater efficiencies in all aspects of building construction present challenges for designers, installers and code officials. These challenges certainly include balancing air distribution system functionality with fire protection requirements within the shared space of structural building elements and other building service items. Requirements for fire protecting duct systems are clearly defined in the International Building Code (IBC) utilized for building construction in the United States. This code dictates duct systems that pass through fire rated horizontal assemblies shall be

Enclosures

located in shafts; transfer openings in shafts are to be protected with fire or combination fire/smoke dampers; and specialized ventilation systems such as ducts serving smokeproof enclosures and exit enclosures shall be enclosed in construction as required for shafts or ductwork enclosed by 2 Hour fire barriers. Despite these prescriptive requirements, unique job site conditions arise where "alternatives" to shafts (often referred to as fire rated duct enclosures) offer potential solutions and therefore are given consideration.

These conditions can include but are not limited to:

- Insufficient space to construct a shaft enclosure
- Inadequate access to fire dampers for maintenance, requiring the shaft enclosure be "extended" to the new damper location
- Fire rated enclosure of ducts that pass through exit enclosures and exit passageways
- Penetrations of shafts where steel subducts are installed but lack continuous vertical air flow
- Penetrations of shafts by kitchen, clothes dryer, bathroom and toilet room exhaust openings, where steel subducts are installed but the exhaust fan lacks continuous power in Group B (Business) and Group R (Residential) Occupancies.

For these situations and others, there are numerous benefits to using fire rated duct enclosures including flexible duct wrap systems. The most common include:

- ✓ Uses less space than shaft construction, thin installed profile
- ✓ Potential for more effective space utilization
- ✓ Contours to fit complex configurations
- ✓ Easy material handling
- ✓ Lower installed cost
- ✓ Listed and labeled systems

Existing and potential fire rated duct applications that could benefit from shaft alternatives include:

- Smoke control, including stairwell & vestibule pressurization ducts
- Exit enclosures and passageways
- Bathroom and toilet exhaust
- Commercial dryer exhaust
- Trash & linen chutes
- Hazardous ducts

Shaft alternative: approval using alternate materials and methods

Fire rated duct enclosures, including flexible fire rated duct wrap systems are increasingly being utilized by design professionals and accepted by Authorities Having Jurisdiction (AHJ's) as a shaft alternative for unique job site conditions.

Example of duct with insufficient space to construct a shaft enclosure

The building code does not define shaft alternative requirements for an air distribution system (except for commercial kitchen grease ducts). Therefore, Section 104.11 of the IBC can be utilized, which permits "An alternative materials, design or method of construction to be approved, where the building official finds the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method, or work offered, is for the purpose intended, is at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability, and saftety"[1] This option is further defined in Chapter 7 on Fire Resistance Rated Construction, Section 703.3 Alternate methods for determining Fire Resistance. Approvals for Alternative Materials and Methods are typically granted for project specific requests. Applications should include supporting documentation, preferably with Listed and Labeled systems tested at an IAS accredited testing lab & inspection agency, which are recognized by ICC. Accreditation Listings can be found at www.iasonline.org or 562-699-0541. Intertek Testing Services and Underwriters Laboratories are examples of accredited companies.

Shaft alternative: performance criteria

One guideline for defining shaft alternative performance criteria is the International Mechanical Code (IMC), Section 506.3.10 Grease Duct Enclosures. For this specific air distribution system application, the code states, "Duct enclosures shall have a fire resistance rating not less than that of the floor assembly penetrated, but need not exceed two hours." Enclosure protection can be provided via IBC requirements for shaft construction, a field-applied grease duct enclosure or a factory-built grease duct assembly. Section 506.3.10.2 Field Applied Grease Duct Enclosure,

Duct enclosure system being prepared for testing per ISO 6944 under full scale duct application conditions

defines the criteria that must be met for it to be used as an alternate to a shaft. This includes:

1 Listed and labeled material, system, product or method of construction specifically evaluated for such purpose (as a duct enclosure configuration)

2 Fire tested per ASTM E2336 (under full scale application conditions, including ASTM E119 engulfment fire test)

3 Duct continuously covered on all sides from the origin to the outlet terminal

4 Duct penetrations sealed with firestop system tested per ASTM E 814 or UL 1479

5 Firestop system shall have an F and T rating equal to the fire resistance rating of the assembly being penetrated.[2]

In this example, the fire rated duct enclosure demonstrates equivalency to a shaft by limiting fire penetration and temperature rise to the next compartment (per ASTM E119 criteria). Both criteria must be met and results are reported as the Fire Resistance Rating of the system. Meeting the pass/fail criteria of the standard verifies stability, integrity and insulation capabilities of the duct enclosure system and its ability to provide equivalent fire resistance to the code prescribed shaft. In addition, a through-penetration firestop system must be utilized to seal the duct penetration opening, which shall provide fire ratings (F) and temperature ratings (T) equal to the duct enclosure and assembly penetrated (per ASTM E 814 criteria). Results are reported as F Ratings and T Ratings. Temperature rise limitations are a mandatory component of ASTM E119, used to define a shaft. Therefore, T Ratings that are equivalent to the F Ratings are mandatory for firestops installed on grease duct enclosure systems used as shaft "alternatives". See Table 1.

Extension of performance criteria to ADS ducts

It is logical that the shaft alternative performance criteria for grease duct enclosures defined in the IMC can be used as a model for other type air distribution system (ADS) duct enclosures. Since the IBC requirements for fire protection of ducts is based on enclosure in shafts, then a shaft alternative for ADS would have the same performance objectives and components as grease ducts, using an engulfment fire exposure test conditions appropriate for ADS duct application. Using this philosophy, the ADS fire rated duct enclosure system must provide equal fire and temperature ratings to demonstrate equivalent performance to a shaft.

ISO 6944-1985 (BS 476: Part 24) "Method for Determination of the Fire Resistance of Ventilation Ducts" is utilized extensively in Europe and other

Table 1. Grease Duct Enclosure Shaft Alternative Performance Criteria

Criteria	Duct Enclosure (ASTM E119) Fire Resistance Rating	Penetration Opening (ASTM E814)
Fire Penetration	No collapse of duct support No passage of flame throughout	F Rating – no openings through firestop
Temperature Rise	Temperature rise limit on	T Rating – temperature rise limit on unexposed side of firestop

Through-penetration firestop system with thermocouples measuring unexposed surface temperature of duct enclosure and sealant to determine compliance with requirement for equal F and T ratings

parts of the world to evaluate the fire resistance rating of ventilation air ducts and duct enclosure systems. This standard evaluates full scale duct systems under application conditions, which is representative of the configuration they will be installed in the field. Performance per ISO 6944 is reported with the following Ratings:

- Stability Rating – no duct collapse (of duct support system)
- Integrity Rating – no passage of flames (through duct or opening)
- Insulation Rating – temperature rise limit (through duct or opening to unexposed side)

Testing per this standard is conducted by North American laboratories (including those with IAS Accreditations and recognized by ICC). Listed and Labeled systems are available on line in each lab's Listing Directory. Design listings reflect the individual ratings achieved for each criteria. However the equivalent fire resistance rating for the system is the lowest rating achieved of the three. Manufacturers of fire rated duct systems under consideration for approval should produce evidence of an Insulation Rating that is at least equal to the fire resistance rating of the assembly penetrated. Approvers should be cautious, as not all systems have achieved an insulation rating that matches the assembly, which demonstrates equivalency to a shaft.

Acceptance by local jurisdictions

Some jurisdictions are developing acceptance criteria for fire rated duct enclosures for ventilation air ducts or ADS. This permits broader approval of the systems and elimination of the need to apply for approval of Alternate Methods and Materials on an individual project basis. Support documentation typically includes Fire Resistant Duct Design Listings provided by IAS accredited labs as evidence of successful fire testing.

One example of a major metropolitan area and jurisdiction that has developed acceptance criteria for the ADS application is the New York City Buildings Department. Their Office of Technical Certification and Research (OTCR) has defined the acceptance criteria for Fire Rated Flexible Duct Wrap Insulation as an Alternate Material in the 2008 NYC Construction Codes under Building Bulletin OTCR 2009-028. Fire rated duct assemblies (duct plus enclosure materials) shall be tested per ISO 6944, ASTM E814 and ASTM E84. Minimum F and T Ratings for the assembly are mandated and defined in the bulletin. Similar criteria are being considered for adoption by many other cities, indicating a growing trend of acceptance for ADS duct shaft alternatives.

An ASTM Test Standard for fire rated ventilation ducts is under development. Once published, this standard can then be considered for inclusion in appropriate sections of Building Codes that cover duct fire protection requirements. Testing and Listing of duct enclosure systems per this new ASTM standard can then be conducted at national testing laboratories providing additional evidence of compliance with shaft alternative criteria.

Evolution from project solver to design option

The use of fire rated duct enclosures as shaft alternatives have provided designers, installers and code officials with solutions to unique project conditions. There is no doubt the benefits associated with flexible duct wrap systems are evolving this technology from project solver to design option, creating the potential to value engineer solutions as the building is being designed. The culmination of industry activities already underway aim to provide AHJ's with a code defined criteria for shaft alternatives beyond grease duct systems. In the meantime, existing Listed and Labeled fire resistive duct enclosure systems are available as supporting evidence for local project submittals and acceptance criteria. IFP

Footnotes

1. International Code Congress, 2006 International Building Code (IBC), Section 104.11.
2. International Code Congress, 2009 International Mechanical Code (IMC), Sections 506.3.10 and 506.3.10.2

References

1. International Building Code 2006, International Code Council, Inc., 2006
2. International Mechanical Code 2009, International Code Council, Inc., 2009
3. BS 476: Part 24 (ISO 6944-1985), British Standards Institution, 1987

Sarah Brewer is a Group Product Manager for Unifrax I LLC with over 20 years experience in various engineering and marketing positions supporting the North American passive fire protection business. She is member of the ASTM E05 Task Group on Duct Enclosures, UL Standards Technical Committee on Grease Ducts and current President of the International Firestop Council (IFC) and Chairperson of its Duct Committee. She is also a member of the National Fire Protection Association (NFPA) and Society of Fire Protection Engineers (SFPE).

New Code Raises Fire Safety

By Mark Froggatt

Marketing Services Manager, Draka UK

The publishing in February of the new BS 8519:2010 Code of Practice has led to a number of misleading claims being made for some cables, with the confusion appearing to have arisen from a misinterpretation of the different test methods required for power and control cables. Mark Froggatt explains.

BS 8519:2010 (Selection and installation of fire-resistant power and control cable systems for life safety and fire-fighting applications. Code of Practice) replaces BS 7346-6:2005 (Components for smoke and heat control systems. Specifications for cable systems). Among other changes it calls for power cables – cables connecting a device to the power supply – to be tested in accordance with BS 8491:2008 (Method for assessment of fire integrity of large diameter power cables for use as components for smoke and heat control systems and certain other active fire safety systems) that itself replaced BS 7346-6: 2005.

The new Standard aims to ensure that the level of circuit integrity is not compromised by other components of the whole electrical distribution system, including cable glands, terminations, joints and cable support systems. It covers: the source of supply; the high and low distribution voltage; the appropriate location of the main intake enclosure, high-voltage and low-voltage switchrooms, transformer rooms, generator rooms, risers, fire life-safety plant rooms and firefighting/evacuation lift motor rooms and shafts.

But what inspired the creation of a new Code of Practice? The main drivers were the increased size and height of many high-rise and complex buildings, the sophistication of the active fire protection installed in many buildings, and the adoption of fire engineered solutions; solutions that demand a high level of reliable performance from building services, including the electrical supplies. In the UK at least, this change was set in motion by the Regulatory Reform (Fire Safety) Order 2005 that heralded in an entirely new approach to fire safety. In place of being told what they must do in terms of fire safety in a building, designers were told what must be achieved.

This Order was followed in 2007 by Approved Document B of the Building Regulations of England and Wales, where certain "large or complex" building structures were singled out: "Where it is critical for electrical circuits to be able

The Bar On Cable

to continue to function during a fire, protected circuits are needed. The potential for damage to cables forming protected circuits should be limited by the use of sufficiently robust cables ….” These cables have to achieve a 120 minute rating when subjected to integrated fire performance testing.

The main changes, when comparing BS 8519 with the now withdrawn BS 7346-6 were an expansion of content to include all life safety and firefighting systems – not only smoke venting and firefighting cores, and the inclusion of new and revised technical guidance relating to the selection and installation of fire-resistant cables and systems for life safety and firefighting applications.

BS 8519 also makes reference to the recommendations identified in BS 9999 (Code of practice for fire safety in the design, management and use of buildings) with regard to the design and installation of the electrical distribution systems and the design, management and use of buildings to achieve acceptable levels of fire life-safety for anyone in and around buildings.

Significantly, in terms of cable selection, BS 8519 identifies three categories of circuit that are required to maintain their integrity under defined fire conditions for fire survival times of 30 minutes, 60 minutes and 120 minutes. Appropriate cable tests are identified for each category, giving the relevant British Standard for the assessment of cable performance under fire conditions that might be expected in an actual incident.

Traditionally, the solution would have been to use mineral insulated cables (MICC) that incorporate insulation of highly-compressed MgO (Magnesium Oxide). These cables are undeniably a robust and long lasting solution, but they are costly, difficult and expensive to terminate, and the quality of some imported mineral insulated cables has become suspect. Supply problems are also often cited as an additional reason for their not being used.

Currently though there are believed to be two cables available on the market that can justly claim to be viable alternatives to mineral insulated cables that meet the power cable requirements of BS 8519:2010. One of these is Draka’s 600/1000V Enhanced grade FTP120 cable – until recently called Firetuf Powerplus. This is an LPCB (Loss Prevention Certification Board) third-party approved SWA (Steel Wire Armoured) power cable that achieves BS 8491’s highest integrated-testing 120-minute rating.

This demanding integrated testing regime involves flame irradiation exposure, direct impact and high-pressure water spray testing for cables that are destined to provide a secure power supply that will retain its integrity in the event of fire for a whole raft of fire safety systems. These include: automatic fire suppression installations; fire detection and alarm systems; fire compartmentation; smoke control and ventilation; sprinklers and wet risers; ventilation and shutters; and firefighting lifts. The test incorporates 115 minutes of direct mechanical impact followed by five minutes of the application of water – in five-second bursts – at a pressure that equates to that of a fireman’s hose.

Somewhat alarmingly, cables are being promoted as complying with the new Standard and hence suitable for power applications that have been not ratified in accordance with BS 8491. These cables have been tested in accordance with BS EN 50200:2006 (Method of test for resistance to fire of unprotected small cables for use in emergency circuits) and are suitable only as control cables – cables that carry information as inputs and outputs. So, great care should be taken to ensure that claims of compliance are not misleading.

Like any Code of Practice, the aim of BS 8519:2010 is to encourage best practice and takes the form of guidance and recommendations. So, any company claiming compliance with a Code is expected to be able to justify any actions that deviate from the Code’s recommendations. Installing a cable that has not been tested to the required power cable regime is a high-risk decision that could have dire and expensive consequences. IFP

Mark Froggatt is Marketing Services Manager at Derby-based Draka UK, He can be reached on +44 (0) 1332 345431 or via email at cableuk@draka.com.
The company’s website can be found at www.drakauk.com

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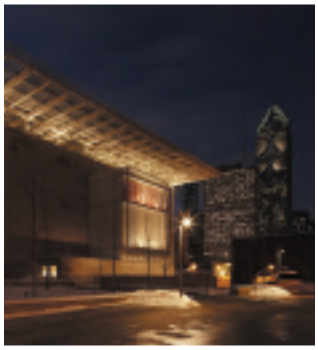
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Good Words and Bad Words

Most of us would acknowledge that, in the past few years, a number of words have entered into everyday use. Two spring to mind: globalisation and networking.

Graham Collins

Of course, in the current somewhat turbulent times, the concept of globalisation is not universally embraced with enthusiasm particularly, it seems, by the environmental lobby; and the term networking comes with the implication that it is a lazy computer-world texting alternative to good old-fashioned, face-to-face communication.

But there is another way of interpreting both globalisation and networking. Globalisation can mean that thoughts, ideas, research, opinions and solutions that are known in one business sector or country are made readily available to a worldwide audience. Networking can mean making the right contacts – those with specialist knowledge or experience – to achieve the best possible solution to a problem. And that is precisely what we aim to do through the regular pages of International Fire Protection.

Our goal is to provide a vehicle through which the latest fire protection technology is accessible across international boundaries; to present solutions, products and systems that are being developed or have been established in one country to a much wider audience. At the same time, by including articles from experts in particular areas of fire protection, we aim to connect people with specialist skills, firmly-held views and knowledge with those seeking to learn more about the latest thinking in fire protection.

This latest edition of International Fire Protection includes what we hope will become a couple of new regular features of the magazine. The first is the inclusion of a section of the magazine where the latest standards and codes of practice will be highlighted and briefly overviewed. The second is a feature called "In my Opinion" where an opinion-former in the industry gets the opportunity to say precisely what is on his or her mind about a current fire safety issue.

Also in this edition you will find articles from two of the world's most prominent fire safety consultancies; one on the special life-threatening challenges associated with large building egress, and the other on the latest detection codes, particularly as they relate to voice alarm systems. We also cover fire protection for the world's historic buildings in some detail with examples from the Czech Republic, China and Germany; delve into the science behind some of the clean gaseous suppression agents; and get an update from the leading authorities on sprinklers. There is also an interesting article looking at the various options for protecting vulnerable and high-value wind turbines. On the passive protection front, this edition includes updates on the importance of effective fire stopping, fire-resistant glazing and intumescent coatings' standards.

To take things to the next stage and further improve two-way communication with our readers around the world, we have recently created an International Fire Protection page on Facebook, an entry on Twitter, and one on LinkedIn. The Facebook page will keep you up to date on what is about to appear in the next edition of the magazine, while both Twitter and Linkedin give you a chance to contribute to any aspect of the global fire protection debate.

They also give you the opportunity to initiate your own topics for discussion; perhaps you have a good word to say about a new code or standard, or a bad word on what you consider to be an emerging trend or fire protection practice? Whichever, they just might be themes that we expand on in future editions of the magazine. Please feel free to contact me at graham.collins@mdmpublishing.com IFP

LTHD detection in aggressive environments

SECURITON AG is promoting its SecuriSens MHD 535 LTHD [Line Type Heat Detector] as offering faster detection of a fire, even in aggressive environments, than conventional smoke detectors or conventional point-type temperature detectors, particularly in applications with high moisture or dust loading. The company is citing wide-spread systems, where it offers cable lengths up to 2000 metres and network capability and fire detection in aggressive environments and hazardous areas in the oil, gas and chemicals industries as the main applications. Typical examples are floating roof tank monitoring, monitoring of inflammable liquids, or fuel transport processing and handling areas. Recently the system has been installed in a glycol plant for ATEX zone-2 fire detection.

Other applications include road tunnels, cable and utility tunnels, ceiling voids and other industrial applications, plus harsh

environments with aggressive gases or extreme temperatures. In addition, the system can be used for product temperature monitoring in pipelines or leakage detection in LNG terminals.

The company claims that its SecuriSens MHD 535 – which offers solutions with ATEX approval – is the fastest LTHD on the market, even for external or tunnel installations with high wind velocity. The maximum cable length is 2000 metres or 250 sensors, and temperature information is transmitted to an evaluation and alarm-generation central processor unit where it is converted to calibrated temperature values. The 250 sensors can be segmented in up to 64 reaction groups for different rooms or fire sections. Each sensor can have up to four different thresholds for pre-alarm and alarm generation, and conventional relay contacts are used to transfer the alarm information to the fire control panel. The SecuriSens MHD 535 can also be used for temperature profile measurement.

For more information please contact:
Securiton AG
www.securiton.com

Chequered Flag for Nittan

NITTAN's Evolution analogue fire detection system has been installed in the new Brooklands Hotel, within the legendary Brooklands motor racing circuit in the UK. The installation features dual optical detectors, optical detectors, heat detectors, call points and interfaces and runs on eight loops controlled by two Advanced Electronics control panels on a fault-tolerant network.

The fire system is directly interfaced to the hotel's own network, enabling information, including faults or fires, to be immediately converted to voice announcements broadcast to the relevant staff via digital-enhanced cordless technology phones. As the fire detection system has an "investigation delay", staff can quickly inspect any alerts and react accordingly.

Evolution is Nittan's premium fire system and is claimed to combine extremely reliable fire detection with a very high degree of protection against unwanted false alarms. Its advanced, highly flexible protocol is resistant to noise, plus it allows substantial amounts of information to be transmitted at high speed.

For more information please contact: Nittan UK Limited
www.nittan.co.uk

Fire Protection for Capital's Museum

Five new galleries at the Museum of London – one of the world's largest urban history museums with custody of more than two million artefacts – that recount the story of the capital from the 1666 Great Fire of London, through to the Blitz, and right up to the present day, is being protected by a combination of XTRALIS VESDA and ICAM ASD (Aspirating Smoke Detection) system.

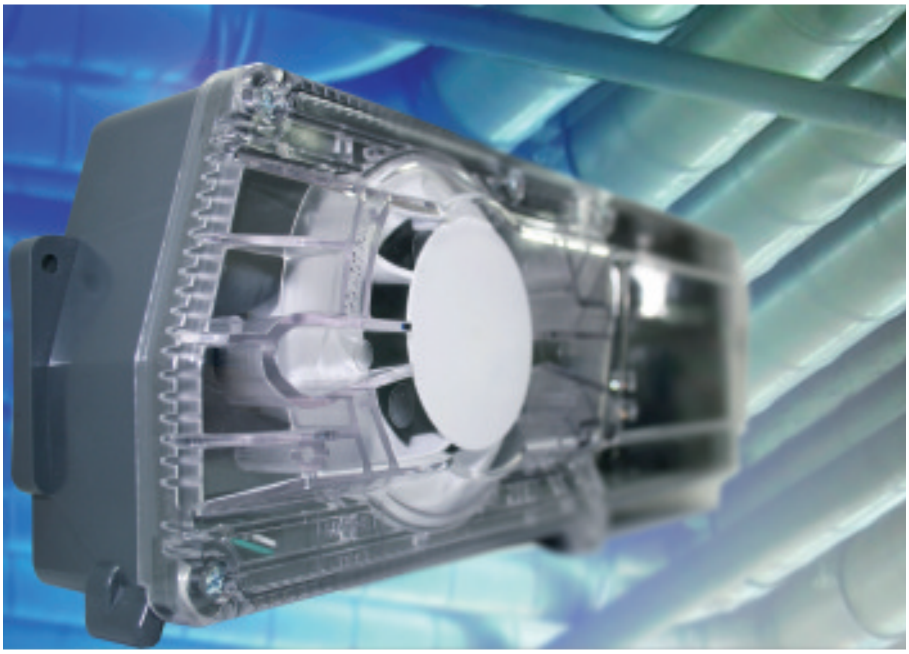
The solution was specified for its advantages over conventional point or beam detections systems in protecting large open spaces; the Xtralis ICAM technology is used in more confined spaces, especially those that are difficult to access. Unlike conventional detectors, Xtralis ASD solutions can be flexibly and unobtrusively deployed to preserve aesthetic features, and maintenance and service is done at a central detector point, minimising scaffolding, ladders and workmen in busy gallery areas.

Xtralis aspirating smoke detectors constantly sample the air for even the smallest of smoke particles, so preventing a small fire from becoming a major incident. A network of pipes can be placed where the smoke is most likely to go, sensing it long before traditional smoke detectors.

This latest installation is one of many undertaken to protect London's heritage buildings. Others include the National Gallery, St. Paul's Cathedral and the Houses of Parliament.

For more information please contact: Xtralis
www.xtralis.com

New Air Conditioning Duct Detectors



As close-control air conditioning systems for computer and IT rooms and air conditioning systems for personal spaces become increasingly common throughout Europe, the risk of fire or smoke spreading through the duct systems they use to transfer the warm and cold air increases. In response, SYSTEM SENSOR EUROPE has developed new detectors to provide specific fire protection for the square and circular air conditioning ducts that form part of such systems.

The new range of InnovairFlex™ range duct detectors comprises both conventional and addressable versions. The addressable version uses the Series 200 Advanced optical detector, while the Series 300 optical detector is used for the conventional version. Both ranges offer what System Sensor describes as class-leading false alarm rejection, through a combination of advanced hardware and software engineering. The air management design of the sensor cover allows the units to monitor ducts with air velocities ranging from 100 feet-a-minute to 4000 feet-a-minute without an increased false alarm risk. Both versions can be fitted with a module to control ancillary equipment; the module is mounted in the unit, saving the cost of an additional conduit box and extra wiring.

One of the claimed unique features is that the housing is made of two interconnected sections that are hinged together, allowing them to be installed in rectangular or square configurations to suit the available space. Also, to simplify installation, the air sampling tubes can be installed, replaced or removed from either the front or the rear of the unit, with a large termination area giving plenty of room for cables.

InnovairFlex has a very wide range of operating temperature and humidity, allowing the units to be installed in aggressive environments such as machine rooms, roof voids and spaces where the temperature and humidity excursions are likely to be extreme.

For more information please contact:
System Sensor Europe
www.systemsensoreurope.com

Five-star Cable for Five Towers

200,000 metres of PRYSMIAN's FP200 Gold cable is currently being installed in the vast fire alarm system throughout the soon to be completed, billion-dollar, 77-storey, Etihad Towers development in Abu Dhabi. Consisting of five towers and located on the waterfront at the end of the Abu Dhabi Corniche, the development incorporates a range of amenities, including a five-star hotel tower, huge shopping mall, 870 luxury apartments and an extensive conference centre.

The Etihad Towers is the latest high-profile project in the Middle East to opt for Prysmian FP cable, following on from the new Emirates Headquarters in Dubai that last year used FP200 and FP400 cable and the new Ethihad Airways terminal, also in Abu Dhabi.

For more information please contact:
Prysmain Cables & Systems
www.prysmian.co.uk

BSI Offers ATEX Certification

A comprehensive range of ATEX explosive atmosphere directive support and certification services is now offered by BSI (British Standards Institution). ATEX compliance is mandatory in the EU for products that are intended to be used in explosive atmospheres, or Ex compliance via the IECEx scheme for markets outside Europe.

BSI, a Notified Body for the ATEX Directive 94/9/EC, offers services that include design advice, pre-assessment of products to ensure they are ready for full assessment, type testing, certification, and storage of the technical files that hold all of the data used to substantiate conformity claims. At every stage of the certification process, support is readily available from the BSI technical team.

BSI claims that using the services for ATEX certification has many benefits. The organisation's specialist expertise ensures the fastest possible access to market for its clients, as delays and uncertainties are eliminated. To provide the most responsive testing service possible, BSI works in partnership with TRaC (Testing Regulatory and Compliance) Laboratories, the leading British testing and approvals company.

For more information please contact:
British Standards Institute
www.bsigroup.com

Fire Fighting Foam Coalition

By Tom Cortina

Fire Fighting Foam Coalition

In May 2001, AFFF and fluorosurfactant manufacturers met in Washington DC with representatives of the US Environmental Protection Agency (EPA), the US military and major foam users to discuss the fallout from 3M's decision to stop production in 2002 of PFOS-based AFFF due to environmental concerns.

It quickly became clear that users and agency staff did not fully understand the differences in chemistry between PFOS-based and telomer-based foam agents. It was also evident that speculation about the future regulation of AFFF was causing problems for the industry. As a result of this meeting, the Fire Fighting Foam Coalition Inc. (FFFC) was formed to ensure that accurate information about telomer-based foams is disseminated to appropriate audiences.

FFFC is a non-profit corporation that represents the AFFF industry's interests on all issues related to the environmental acceptability of firefighting foams. The Coalition provides a focal point for industry technical reviews, development of industry positions, and interactions with relevant organizations, such as environment agencies, militaries, approval agencies, and standards bodies. Members are AFFF manufacturers, fluorosurfactant manufacturers, and distributors.

Key messages

In order to clarify the differences between PFOS-based and telomer-based foams, FFFC has developed the following key messages:

- Fluorosurfactant-containing foams such as AFFF are the most effective agents currently available to fight flammable liquid fires in military, industrial, aviation, and municipal applications. They provide rapid extinguishment, burn-back resistance, and protection against vapour release.
- Telomer-based fluorosurfactant foams such as AFFF, FP, and FFFP are not banned from use. We are aware of no pending legislation to regulate telomer-based fluorosurfactant foams in Europe, Canada, Japan, or the United States.
- Telomer-based AFFF agents do not contain or breakdown into PFOS (perfluorooctane sulfonate), are not made with PFOA (perfluorooctanoic acid), and contain between 30 percent and 60 percent less fluorine than PFOS-based AFFF.
- The C6-based fluorosurfactants that have been the predominant fluorochemicals used in telomer-based AFFF for the last 25 years are low in toxicity and not considered to be bioaccumulative or biopersistent.
- New products based on C6 telomer chemistry are currently being developed and introduced around the world because they are considered to be safer for the environment than C8 and above. Fluorochemical manufacturers are voluntarily working to eliminate C8 and higher homologue chemicals from products and plant emissions by 2015 under the EPA PFOA Global Stewardship Program.
- Telomer-based AFFF agents that contain greater than 95 percent C6 fluorosurfactants and meet the world's most challenging foam standards have been on the market for decades, so manufacturers are confident that the new products will retain all of the same fire suppression capabilities as existing AFFF agents.

Key activities

One of the important roles performed by FFFC is to respond to inquiries from organisations around the world as they evaluate the impact of the PFOS phase-out on foam use in their countries. FFFC has a philosophy of open and honest communication as it relates to the products that our industry manufactures. We have provided extensive information on firefighting foams to environmental agencies and armed services in the United States, Europe, Canada, China, and Australia that includes the following:

- Amount of fluorosurfactant actives used in the manufacture of AFFF in the US.
- Chemical structure of the fluorosurfactants used in major fluorotelomer-based AFFF formulations.
- Mechanics of film formation.
- Groundwater monitoring data from US military fire training areas.
- US inventory of PFOS-based and telomer-based AFFF.
- Overview of the different types of foams, the market channel for their distribution, and the environmental fate once they are used.
- Aquatic toxicity of fire fighting foams.
- Toxicity, bioaccumulation, and biopersistence potential of AFFF-type fluorosurfactants and their likely breakdown products.

FFFC has also published an AFFF environmental fact sheet, eight newsletters, and numerous journal articles on foam-related issues that are available on the web at www.fffc.org.

Moving forward

The PFOS issue had the potential to deprive firefighters of their best resource for preventing loss of life and destruction of property from flammable liquid fires – fluorosurfactant-based AFFF foams. Fortunately, telomer-based AFFF continues to be the agent of choice to protect against this threat, and manufacturers have developed enhanced foam formulations with reduced environmental impacts that can be used well into the future. One of the main reasons for this positive outcome is the work of FFFC and its member companies. IFP

Tom Cortina is Executive Director of the Fire Fighting Foam Coalition www.fffc.org

AFFF Foams . . .

So everyone will make it home safely tonight.

Today's advanced AFFF agents:

- Are most effective to fight flammable liquid fires.
- Provide the best extinguishment and burnback performance.
- Have minimal environmental impact.
- Have a low toxicity and biopersistence profile.
- Are approved by global regulatory agencies.

FFFC Fire Fighting Foam Coalition
www.fffc.org

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NEWS

Controlled Flow Cuts Suppression Costs

KIDDE PRODUCTS has launched ARGONITE® C60 total flooding fire suppression system for enclosed spaces, the next generation of its ARGONITE product range. The new system introduces a unique patented Controlled Flow Technology, allowing considerable savings to be made on system installation costs, while delivering performance that meets or exceeds applicable regulatory and environmental requirements.

When activated, the ARGONITE C60 system controls the gas release throughout the discharge period, meaning that the peak mass flow of the gas is 60 percent less than other systems, with no reduction in fire suppression efficiency. As a result, smaller and less costly pipework can be used in the distribution network, and pressure relief requirements are greatly reduced allowing further savings to be made. The controlled flow technology allows homogeneous distribution of the gas in the enclosure, as well as reducing both noise and pressure impulse impact that could otherwise affect sensitive electromechanical equipment.

It is suitable for use in a wide range of applications, including data processing and communication centres, clean rooms, oil and gas installations, power generation facilities, museums and galleries. For buildings where fire protection is required in more than one area, the system allows significant space and cost savings to be achieved by using a single bank of cylinders in conjunction with diverter valves to direct the gas to the area where it is needed.

ARGONITE is a 50:50 mixture of argon and nitrogen, gases that are natural constituents of the atmosphere. It is non-corrosive and non-conductive; it produces no by-products when exposed to high flame temperatures. It may be used in manned areas, and it has a zero Ozone Depletion Potential and a zero Global Warming Potential.

For more information please contact:
Kidde Products
www.kiddeproducts.co.uk

New Detectors Use Hart Communication

DETECTOR ELECTRONICS CORPORATION – Det-Tronics – has introduced flame detectors and gas detectors that use the HART communication protocol. It has added HART functionality to its X9800, X2200, and X5200 flame detectors, permitting digital signals carrying information such as diagnostic parameters and device configuration to be transmitted simultaneously with the 4-20 mA analogue signal.

The enhancement results in a more efficient device set-up because facilities can easily configure and adjust many detector variables. For example, a device can be given a recognizable name, such as "line 1 flame detector." Variables then can be set and adjusted using universal HART commands.

"Workers in the control room or field can configure or change device settings using a variety of tools," says Product Manager Mike Bragg. "They can enter HART commands locally or remotely via our FlexVu Universal Display, a HART communicator, or an asset management system."

Modifications to device settings are simple. By sending a command, a user initiates calibrations, reviews logs, or adjusts alarm and warning set points. Additionally, users accurately assess device conditions, such as fault frequency, and prepare for tasks before venturing into the field. Easily accessible, automatically-generated event logs present viewable history and possibilities for improvements. Time- and date-stamped records of activities, such as calibration and device replacement, provide regulatory-compliance evidence for system audits.

For more information please contact:
Detector Electronics
www.detronics.com

New Intrinsically Safe Panel Mount Sounder

E2S has added a new product to its intrinsically safe range of sounders and beacons, the IS-pA1 panel mount sounder, which is certified II 1G Ex ia IIB T4/5/6 for use in Zones 0, 1 and 2. The IS sounder is said to be ideal for use as fault indication or process alarm in control panels located in intrinsically safe environments. It produces a 100dB(A) at one-metre continuous 600Hz tone that can be pulsed externally to produce different signals.

To reinforce the audible warning signal, E2S also offers the intrinsically safe IS-pB1 panel lights. The high efficiency LEDs, which are mounted behind red, amber, green, blue or clear lenses, have a typical operating life in excess of ten years. Powered via Zener barriers or galvanic isolators, the panel mount sounder and lights produce reliable and cost-effective status indications with minimum power consumption.

The E2S IS range also includes the IS-mini sounder, beacon and combined units, as well as the IS-L101L LED beacon and the IS-A105N sounder, which are approved to ATEX, IECEx and FM.

For more information please contact:
European Safety Systems
www.e2s.com

New VESDA ECO and ICAM ECO from Xtralis

Xtralis adds gas detection to its market leading VESDA and ICAM aspirating smoke detection technologies

A fire can have catastrophic consequences and cost millions of dollars in business disruption, and result in the tragic loss of lives and assets. The key to fire protection is the mitigation of risk through early warning. By detecting a fire before it escalates, an effective response can be staged.

The same principle applies to gas detection. This invisible hazard can originate from the release of toxic gases, oxygen deficiency or the presence of combustible gases and vapours. Yet when detected at an early stage, countermeasures can be initiated to protect personnel and property.

Xtralis has launched VESDA ECO and ICAM ECO, the industry's first system to cost-effectively combine aspirating smoke detection (ASD) with gas detection and environmental monitoring, building on its market-leading VESDA and ICAM very early warning smoke detection technologies.

These newly available solutions use new or existing VESDA or ICAM pipe networks to reliably detect smoke and hazardous/combustible gases to ensure air quality. They also integrate easily with other building management systems for real-time situational awareness and intelligent emergency response, including the activation of demand-controlled ventilation to control costs and save energy.

"Because we want to deliver more value to our customers and end users, Xtralis has extended the integrity and high performance of its ASD systems beyond smoke to also include gas detection and environmental monitoring," explains Xtralis President and CEO, Samir Samhouri. "Every VESDA or ICAM customer now can amortise the cost of their existing smoke detection infrastructures to reliably and accurately detect certain gases early enough to prevent damage to staff and assets and prevent unnecessary and costly down time."

Now customers across a wide array of industries, including data/telecom, manufacturing and transportation, can rely on the VESDA ECO and ICAM ECO for very early warning fire detection, protection against hazardous gas leaks, air quality monitoring to ensure safe working environments, and help to reduce energy consumption and costs.

With an ECO detector installed on a VESDA or ICAM pipe network, air can be conditioned or filtered to remove moisture, dirt and other particulates that can cause traditional gas-detection systems to false alarm or become contaminated. As with fire detection, early warning of a gas leak or build-up enables countermeasures to be taken to protect personnel, property and business operations.

Each VESDA/ICAM ECO detector can house up to two gas sensors, and additional detectors can be added easily to the pipe network to monitor more gases if required. In its initial release, the solution can be configured to detect ammonia (NH_3), carbon monoxide (CO), hydrogen (H_2), hydrogen sulfide (H_2S), methane (CH_4), nitrogen dioxide (NO_2), oxygen (O), propane (C_3H_8) and sulfur dioxide (SO_2).

VESDA/ICAM ECO provides point, zone or total-area coverage to suit different applications in a wide array of environments, including battery-charging rooms, underground utility tunnels, boiler rooms, manufacturing facilities, parking garages and transportation centres. The systems easily integrate with fire alarm control panels (FACP), programmable logic controllers (PLC), heating ventilation and air conditioning (HVAC) systems, and building management systems (BMS) to provide real-time situational awareness for intelligent emergency response. No construction or electrical conduit is required. IFP

For more information, visit www.xtralis.com/vesda-eco or www.xtralis.com/icam-eco

Strength, Functionality and Innovative Design

The new generation of stylish design fire extinguisher from Minimax

Stronger extinguishing power and a well thought-out technical design to make it more user friendly is what distinguishes the new generation of Minimax fire extinguishers. At the same time, the company has focused on design to raise the aesthetic standard of mobile fire protection

Minimax Mobile Services has developed its new generation of fire extinguishers based on the pledge – functional safety, durability and the best 'Made in Germany' quality. As a producer of fire extinguisher with the highest rate of vertical integration, we use sophisticated quality control procedures at every stage of production to guarantee our standards. The use of high-quality materials also ensures that our extinguishers are in a state of permanent operational readiness, which is characterised by their impressive extinguishing power and sophisticated technical design that ensures enhanced user-friendliness. However, in addition to the proven Minimax performance attributes, our new series is also strong on innovation.

More powerful than ever

The new generation's improved high-performance extinguishing agent formulations and the equipment design combine to guarantee abundant extinguishing power.

More user-friendly than ever

The revised operating instructions simplify fire extinguisher operation by using more symbols and less text. Consequently, even inexperienced users can operate the fire extinguisher safely in the event of fire. The colour-coded controls – safety, pressure level and tube grip – also ensure safe operation in the event of fire.

More versatile than ever

The newly developed armature made of shock-resistant, high-performance plastic, and with proven single-handle operation, enhances the Minimax offering. The result is a significant weight reduction of up to one kilogram compared with other Minimax armature models.

More environmentally friendly than ever

Minimax uses exclusively extinguishing agents that are harmless to people and animals, yet offer a maximum of extinguishing capacity for safe extinguishing without ongoing environmental risks.

Minimax fire extinguishers share nearly identical design and construction features, ensuring efficient servicing that is a measurable benefit for Minimax Mobile Services customers.

Minimax Hydrant

Minimax Portable

Perfect combination of safety and style

Minimax offers entirely new design options to its demanding customers, particularly those who are concerned to ensure that their extinguishers can be integrated tastefully into their particular environments. First-class craftsmanship and creative decoration have transformed the standard red extinguishers into unique and decorative works of art.

So, Minimax extinguishers not only ensure safety; they also add stylish design touches to an interior. Thanks to the four new versions, you can now let your creativity run free. With the refined *Edition Line*, you can choose the support colour and pattern to create the perfect match for every environment. In our *Logo Line* series, your own brand logo can be positioned in any size and form on the extinguishers. Our artists make every extinguisher in the *Individual Line* unique – with the design of your choice or even incorporating a personal photograph. Whether chrome-plated or coated with real beaten gold, the exclusive design extinguishers in the *Luxury Line* are a real architectural luxury.

Of course, as the regulations stipulate that portable fire extinguishers should be red, approval by the local regulatory authority for fire protection will be necessary if the different coloured designs are to be used in commercial environments. However, the design fire extinguishers in domestic applications may not be subject to such constraints.

The wall hydrants in the Minimax *Prestige Line & Future* are also guaranteed to be a stylish centre of attention. This individual combination of reliable protection and style is currently only available from by Minimax Mobile Services, as the company has the exclusivity distribution rights in Germany. IFP

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PROFILE

Manufacturing the Market Leading Sounder

The more things change, the more they stay the same!

The ROSHNI is the fire industry's leading conventional alarm sounder and has been for more than 20 years, although it does find use in many more applications, from industrial signaling to security and safety systems.

Fig 1 ROLP Solista Red

The ROSHNI existed long before any of the current EN54 fire standards existed and yet required no significant modification to pass the test regimes of EN54-3 and became the first sounder to be approved even though the standard was still in draft format.

Even though the product looks the same as it ever did, beneath the skin there has been a steady evolution to both improve performance and improve its environmental credentials. Changes to the electronics have often been enforced by component suppliers, but at each change the opportunity has been taken to enhance the ROSHNI either by improving efficiency to reduce power consumption, or to improve accuracy of the alarm tones or even to offer additional features for particular customers.

The mechanical design has changed too. The fit of the bases and the performance of the sealing has been improved, while the need for the encapsulation of the electronics has been eliminated allowing the product to be both lighter and easier to recycle. The major visual change has been the introduction of the ROLP (ROSHNI Low Profile) over ten years ago.

The ROLP performs identically to the ROSHNI and has the benefit of a reduced profile for improved aesthetics. While the ROSHNI and ROLP have run in parallel for over ten years, the manufacturing issues of running the two parallel ranges does mean that the original ROSHNI will, for all practical purposes, disappear during 2011, leaving the ROLP as the main version.

Fulleon has made attempts to upgrade the format over recent years and offer extra benefits, but the resistance from customers was surprisingly robust proving that the basic concept for the ROSHNI and ROLP are fundamentally sound and as correct for today's market as they were a quarter of century ago.

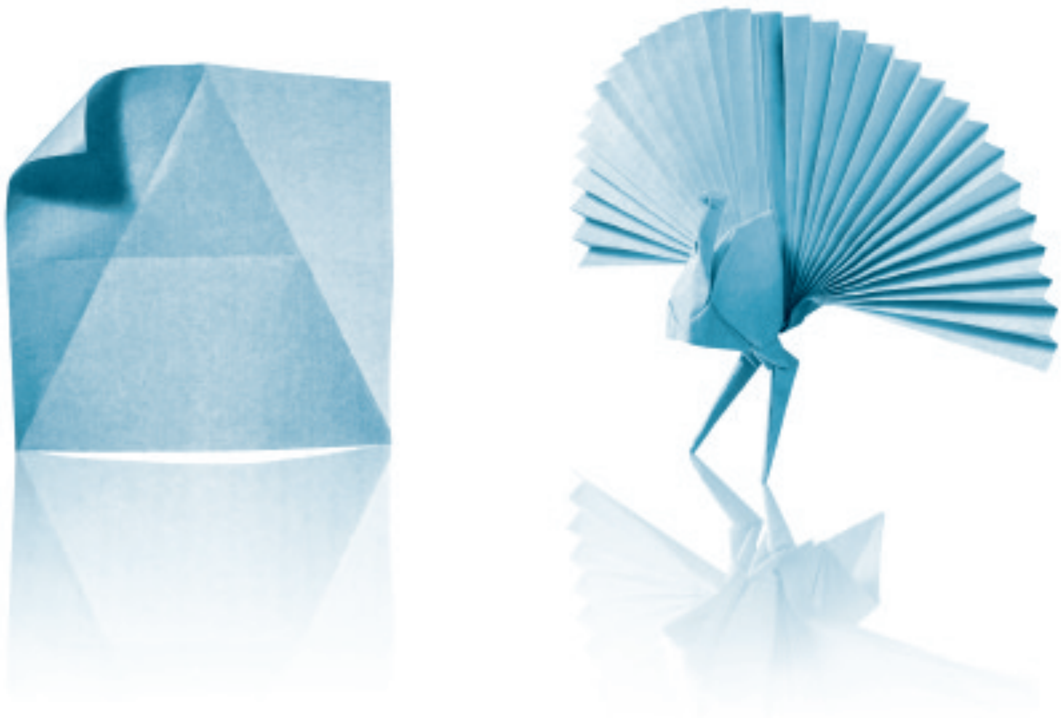
Fig 2 Red ROLP

Flexibility has proven to be a key feature to the ROSHNI and ROLP's success. The variety of bases, "Shallow", "Deep" and "U" provide the installer with solutions to fitting the product in most locations using the variety of wiring practices found across Europe. There is even a shallow base variant for use with American 4" x 2" wiring boxes. The wide operating voltage too allows the sounders to be used in all types of safety and security systems. The addition of the "Mains Base" in recent years has built the range by allowing any of the standard 24Vdc products to be used with 110 to 230Vac supplies without having to resort to specific product versions.

Markets have not been static and the growing awareness of disability has driven the move toward combined audible and visual devices (AV) so the original "FLASHNI" with Xenon beacon has spawned the ROLP SOLISTA with LED beacon and much lower power consumption and "Combi" units, which allow the ROLP and various types and numbers of beacon to be combined to suit customers specific requirements. Certain customers have also demanded a louder version, so the ROLP MAXI was introduced with the main tones enhanced by 5dB and a complementary AV version was also included.

With over ten million ROSHNI family products manufactured, the reputation of the product is not just about performance, but reliability and consistent quality. Manufacturing processes employed at Fulleon are the foundation to the continued success. An experienced manufacturing workforce with low staff turnover has resulted in a high level of awareness for product quality and the way they are produced. The Quality Management System (QMS) is audited to ISO9001:2008 by UL and LPCB, and the many Lean Manufacturing initiatives provide greater efficiencies and reduced time to the customer. IFP

For more information, contact **Cooper Fulleon** on info@fulleon.co.uk or visit the website www.cooperfulleon.com



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Structural Steel Protection

Passive fire protection. The role of thin-film intumescent coatings

Thin-film intumescent coating enhances the visual appearance of a structure, allowing the architect to show the steel construction while protecting its structural integrity. Mark Cooper explains.

By Mark Cooper

Technical Manager
Cellulosic Passive Fire Protection Europe
PPG Industries (UK) Limited

Thin-film intumescent coating is a passive fire protection method that enhances the appearance of a structure, and can even add to the aesthetic appeal of the design by adding decorative finish and colour. This enables architects to display the steel construction while, at the same time, protecting its structural integrity in the event of a fire, allowing safe evacuation and providing the access time required by the fire and rescue services.

Manufacturers of thin-film intumescent coatings are constantly expanding their theoretical knowledge and developing their products that, naturally, have to be subjected to the prevailing standards and assessment methods. However, following the recent introduction of BS EN 13381-8: 2010 (Test methods for determining the contribution to the fire resistance of structural members. Applied reactive protection to steel members) there is currently a degree of uncertainty within Europe regarding each country's implementation date and the withdrawal of national standards.

This is further complicated by the existence of DD ENV 13381-4: 2002 (Test methods for determining the contribution to the fire resistance of structural members. Applied protection to steel members) to which numerous manufacturers' products have already been tested. Clearly, the aim is to have one standard throughout Europe with CE-marked materials and systems. Work has already started on the beams with web openings standard, EN 13381-9, with ETAG 18 Part 2 [European Organisation for Technical Approvals: Fire protective products. Part 2: Reactive coatings for fire protection of steel elements] also undergoing revision.

Product certification

During the past few years there has been an increase in third-party certification of thin-film intumescent coating manufacturers, which resulted in greater end user confidence. Manufacturers have worked together with several certification bodies to identify which critical manufacturing processes and key raw material changes could influence the performance of the product. This has resulted in the creation of industry-standard guidelines such the British Coatings Federation's *BCF Guide to a Quality Control Fire Test Regime for Intumescent Coatings*, which is being adopted gradually throughout Europe and beyond.

Specification and application

The main focus for the choice of a thin-film intumescent coating on new-build projects is often determined by the thicknesses required for a given fire protection period, coupled with the material price. Surface preparation, coating application, primer and topcoat selection is often an afterthought. However, if not correctly specified, this can result in failure to perform in the event of a fire.

The first process is to identify which intumescent fits the building designer's requirements, in terms of the fire protection period needed and the durability requirements of the final system. This information can be obtained direct from the product manufacturer, who has relevant certification and approvals for the particular market.

Environment classification

Most specifiers are familiar with the Environment Classifications described within ISO 12944 Part 2: 1998 C1, C2, C3, C4 and C5 (Paints and varnishes. Corrosion protection of steel structures by protective paint systems. Classification of environments). However, it is necessary to note that ETAG 18 Part 2, which is used for the durability testing of intumescent coating systems, has its own Classifications X, Y, Z1 and Z2. As yet, there is no clear crossover between the two standards and advice from the intumescent coating manufacturer should be sought.

Surface preparation and primer selection

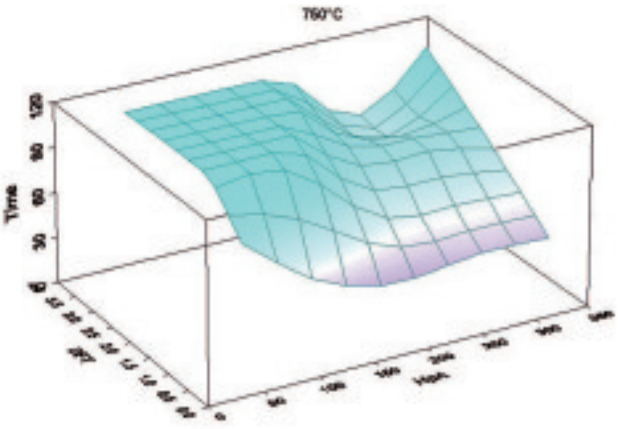
With the exception of galvanized steel, all surfaces should normally be abrasive blast cleaned to Sa 2½ – ISO 8501-1:1988 [Preparation of steel substrates before application of paints and related products].

The type and dry film thickness will be decided by a number of factors:

- Construction time from fabrication/primer application to project completion.
- Intumescent type (solvent based/water borne).
- Environment during construction and end use.
- Expected durability.

On many occasions, steel may arrive already primed, and this primer coating will need to be

Intumescent Graph



The 3D Interpolation method is an assessment method for the characterisation of intumescent coatings for the protection of structural steelwork against fire. It describes how the factual data from fire tests is used and how measured performance times are projected in a 3-dimensional space.

Each test specimen can be presented by a dot (x, y, z) in the 3-dimensional space. Three dots form a plane and the mathematical equation of the plane facilitates calculation of the performance time t (z-value) for any combination of section factor Hp/A (x-value) and dry film thickness DFT (y-value) within the boundaries of the plane. The combination of a large number of intersecting planes forms a landscape of 'rolling hills', identifying the performance time of any intumescent coating with great precision 3-dimensionally.

The 3D Interpolation Method can visualise the performance as a function of Hp/A, DFT, time and temperature. The illustration shows a 3-dimensional graph of an intumescent coating in the heating process at one temperature stage of 750°C steel temperature.

identified correctly to ensure compatibility with the intumescent coating. This can generally be approved by generic type, as in ETAG 18 Part 2, but should always be approved by the manufacturer.

Failure by the intumescent installer to identify that the specified primer has been applied may result in delamination of the intumescent coating, as it has been known for alternative primers to have been substituted without informing to all parties involved in the project. For example, if an epoxy zinc phosphate was specified, substitution by an epoxy zinc-rich under normal circumstances could be considered as an upgrade in corrosion performance. However, application of a waterborne intumescent coating without an additional sealer coat would result in detachment of the intumescent coating.

Top coat selection

The final process is to identify a suitable topcoat. This is determined by the environmental exposure, required durability and decorative finish.

Unlike corrosion specifications, the durability of an intumescent coating is reliant on the integrity of the topcoat, which provides a barrier from the environment. Continual inspection and maintenance of the topcoat is therefore vital, particularly in aggressive environments. It is essential that all topcoats are approved by the intumescent manufacturer before application for compatibility, durability and performance in a fire. Although primers tend to be approved on generic types, this not the case for topcoats. Application of the wrong topcoat may result in loss of insulation performance in a fire due to it restricting the intumescent char expansion.

Fire engineering

Large projects frequently require additional fire engineering to meet all fire protection requirements, in which the coating supplier, designer and contractor develop solutions for specific applications and construction solutions. Experienced coating suppliers are equipped with the latest laboratory facilities for formulating and fire testing, and custom-made solutions can be developed to ensure dependable and compliant fire protection.

One such project was the Muziekpaleis or Music Palace in Utrecht in the Netherlands, where PPG Protective and Marine Coatings was awarded the protective coatings contract. This iconic music venue is part of a complete €133 million renovation of the area around the railway station, and the new building will replace an old music centre. It is predicted to become one of the world's premier music venues.

The building has space for 5,300 people to be entertained simultaneously, and around 725,000 visitors are expected each year. The decoration will reflect the world's musical diversity, with the building being divided into four main halls, each developed in a different style by four different architects.

The main contractor, Heijmans NV, which operates in Belgium, the UK and Germany, is building the project for the City of Utrecht, and specialist subcontractor CSM NV, one of Belgium's most preeminent steel fabricators will produce and paint the 4,000 tonnes of steel to be used in the project. Much of the steel will be protected anti-corrosive or passive fire protection systems. The anti-corrosion coating on carbon steel will be a three-coat system based on SigmaWeld 199 as prime coat, SigmaFast 205 as build-coat and SigmaDur 580 as durable finish coat. For the galvanized steel components, a two coat system will be used based on SigmaCover 280, top-coated with SigmaDur 580.

The prefabrication primer system for the passive fire protection system will be SigmaWeld 199, followed by SigmaFast 205 as permanent primer. The intumescent coating for the passive fire protection is Steelguard 561, which will be finished with Steelguard 2458 topcoat.

One of the main reasons PPG Protective and Marine Coatings and its Steelguard 561 was selected for this project was the timely release of the "three-dimensional assessment method" used for the Steelguard passive fire protection system test data that, under the new European standard, can be used to optimally assess the fire test results. IFP

Mark Cooper is Technical Manager Cellulosic Passive Fire Protection Europe PPG Industries (UK) Limited's website is at www.ppgpmc.com

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Sprinklers Upda

International move for greater adoption of sprinklers

A lot is going on in the sprinkler world, all of which promises a bright future for sprinklers even if today the market is depressed following the construction downturn. Alan Brinson, Executive Director of the European Fire Sprinkler Network, elucidates.

By Graham Collins

With reference to Alan Brinson, Paul McTurk, John Bonney and Iain Cox

Traditionally, fire safety has been designed into buildings through compartmentation. This approach has been successful in many fires, but it will not help anyone who remains in the compartment. Sprinklers are the only technology to offer some hope to anyone unable to hear the alarm or to respond to it. For this reason sprinklers are required in care homes in an increasing number of countries – Australia, Canada, Denmark, Finland, New Zealand, Norway, Scotland, and the United States – where it is obvious that residents may not be able to evacuate in time.

In Finland and the United States, the requirements are often retrospective. Sweden has announced it will join this group in the autumn and one of Germany's sixteen states, North-Rhine Westphalia, has drafted regulations that give incentives to fitting sprinklers. Norway is the only

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European country to require sprinklers in hospitals, but thousands of hospitals in North America are sprinklered. In Europe, fire engineers are increasingly designing fire safety in hospitals with a protect-in-place strategy, since it can be dangerous to move some patients. To make this possible they include sprinklers in their designs.

Over the past five years, most European countries have introduced requirements to fit sprinklers in high-rise buildings, where evacuation and rapid fire brigade access can be difficult. However, the height at which this becomes mandatory can vary from nine metres in Portugal to 200 metres in France. Large new hotels are covered by these requirements and are therefore often sprinklered.

Over the past five years, most European countries have introduced requirements to fit sprinklers in high-rise buildings, where evacuation and rapid fire brigade access can be difficult. However, the height at which this becomes mandatory can vary from nine metres in Portugal to 200 metres in France. Large new hotels are covered by these requirements and are therefore often sprinklered.

Again Norway is the only country to require sprinklers in all new hotels. The Norwegian requirement took effect on 1st July 2010. Sprinklers are now also mandatory there in new housing of more than two storeys. This measure is part of the Norwegian government's commitment to Universal Design, under which homes should be safe for everyone, including those with disabilities. Several other European countries are studying the benefits of fitting sprinklers in homes, and there is a real likelihood that Wales will mandate the fitting of sprinklers in all new homes in 2011. In the United States, campaigners are pressing each state to mandate sprinklers in new housing. Half a dozen states have already adopted legislation, including California where it will take effect on 1st January 2011.

Fire engineering is also encouraging the use of sprinklers; for example, with moderate relaxations in compartmentation or fire brigade access that is permitted if sprinklers are fitted. DIN 18230 (Structural fire protection in industrial buildings) and BS 9999 (A New Approach to Design of Fire Precautions in Buildings) codify some of these permitted relaxations, while CEN (European Committee for Standardization) is looking to introduce a methodology to assess designs that use sprinklers as an alternative to prescriptive codes.

Another important reason to fit sprinklers is to protect the environment. Carbon dioxide emissions from buildings due to fires are enormous when one considers not just the material that burns, but the embodied carbon in building materials. The carbon footprint of our buildings could be reduced if they were all fitted with sprinklers, even allowing for the added carbon loading for the sprinkler systems in buildings that do not suffer a fire. Furthermore the Environmental Liability Directive has established the polluter-pays principle in European law. Emissions to the air or ground water from a fire can lead to large fines. To help prevent this scenario several countries now require sprinklers in large new factories and warehouses.

European standards are advancing to keep pace with fire safety code developments. Updates to EN 12845 (Fixed firefighting systems. Automatic sprinkler systems. Design, installation and maintenance) the sprinkler system design standard, have been drafted and it is hoped they will be included by 2011. The committee is working as fast as the CEN process will allow for this standard to reflect the latest technology. Meanwhile the sprinkler industry continues to innovate, with new sprinklers for warehouses, homes and prisons, as well as many other excellent ideas to make it easier and more economical to install sprinklers.

The cost of peace-of-mind

The British Fire Consortium claims that a sprinkler system is the only device that can detect a fire, sound the alarm, call the fire brigade and control or extinguish a fire all at the same time.

According to the BFC (British Fire Consortium), the most common cause of fire-related death is smoke inhalation. Sprinklers dramatically reduce the amount of smoke created, as they attack the fire in its early stages and, because sprinklers wash the larger particles out of smoke, its density and toxicity is reduced.

Each sprinkler head is individually activated by the heat of a fire and, in the majority of cases, only one head will be triggered, which will be sufficient to extinguish most fires. A key barrier to the adoption of sprinkler systems used to be the fear of water damage and clean-up costs, but domestic fire sprinklers only spray ten gallons to 15 gallons of water a minute, compared with a fireman's hose that jets out between 250 gallons and 500 gallons a minute.

Paul McTurk, Managing Director of BFC member company, Phoenix Fire, cites fear of arson in schools as the key driver of most current local authority sprinkler specifications. He comments: "We have fitted systems in schools that have suffered serious fires during in school holidays, because a sprinkler system is seen as the only way

to protect premises when they are empty. " He continues: "However, this peace of mind represents a significant investment, as a system comprising 1500 sprinkler heads – a typical number installed across a large secondary school premises – can cost up to £350,000. Primary or first school installations may comprise as many as 250 to 300 heads and represent an investment of between £70,000 and £90,000."

On the plus side, he does point out that the installation of a comprehensive sprinkler system may provide scope for negotiating insurance premiums.

UK brigades encouraged to promote sprinklers

The UK's CFOA (Chief Fire Officers' Association) believes that sprinklers save lives and it is vital that this message is received and acted upon both within and outside of the fire industry.

John Bonney, President of CFOA announced recently in his speech at the UK Fire and Rescue Conference that all fire and rescue services within the UK will be issued with a briefing pack highlighting the key protection benefits sprinklers can offer.

John Bonney said: "Sprinklers are surrounded by myths and misconceptions and it is up to as the leaders of the UK fire and rescue service to provide factual information to dispel those myths. As such, we will (today) be issuing briefing packs to all our members to help to co-ordinate national activity and spread knowledge and awareness of the benefits of sprinklers beyond the fire sector."

New sprinkler alliance

The BSA (Business Sprinkler Alliance) is a newly incorporated coalition working to achieve greater business resilience through enhanced protection against fire.

A new organisation has been formed to promote the uses of sprinklers that brings together the majority of the "big guns" in the industry. Founding members of the new Business Sprinkler Alliance include: the Chief Fire Officer's Association (CFOA), "the professional voice of the Fire and Rescue Service"; the National Fire Sprinkler Network (NFSN), a non-profit organisation that works in partnership with the Fire Community; the European Fire Sprinkler Network (EFSN), a European coalition that encourages the greater use of fire sprinklers; the British Automatic Fire Sprinkler Association (BASFA); the UK's trade association for fire sprinklers; and leading commercial property insurer FM Global.

Commenting following the inauguration, Chairman of the Business Sprinkler Alliance, Iain Cox, CFOA Director for Prevention and Protection, Chair of the National Fire Sprinkler Network and Chief Fire Officer of the Royal Berkshire Fire and Rescue Service said: "Tackling a fire at its earliest stages is vital for protecting a building, a company's assets and the welfare of the people who work there. The recent warehouse fire at London's Heathrow Airport is a perfect example of how fire can occur at any time, especially in hot weather, and how sprinklers can begin suppression within moments, thereby extinguishing it or at the very least preventing it from becoming wide spread."

He continued: "Had the company involved installed sprinklers, the building would not have become being fully alight, requiring over a hundred firefighters from London and neighbouring brigades to extinguish. Sprinklers would have turned the incident into a minor inconvenience and ensured business continuity at Heathrow was not compromised." IFP

Understanding Fir

By Wilf Butcher

Chief Executive, Association for Specialist Fire Protection

Fire stopping is a serious business. Getting it wrong can have dire consequences, as Wilf Butcher explains.

In the current tough economic environment, all contractors will look for ways to increase the size of their offering by finding additional, related works they might have previously sub-contracted, or seen to go into someone else's contract. At the same time, quantity surveyors are often on the lookout for ways to combine works in order to minimise the number of sub-contractors.

For interior specialists, a common application that they will consider is the fire-stopping around service penetrations and movement joints. As these can often be in partitions that these sub-contractors have erected, there seems – on the surface – to be an obvious synergy. Fire-stopping, however, serves a number of functions and has to fulfil several criteria that, if not met, could leave a contractor vulnerable should things go wrong.

The primary purpose of fire-stops is to reinstate breaches in compartment walls and floors. The compartments themselves are designed to limit the spread of fire and smoke within a building making them a crucial element in the life safety and property protection elements of a building's fire strategy.

All compartment walls and floors will have a pre-defined rating, usually between one and two hours but this could be up to four hours in some circumstances. The rating will cover two aspects, the ability of the product to withstand the passage of flame and its ability to resist the transfer of excessive heat.

This second requirement is to ensure that fire cannot spread through the build-up of heat causing spontaneous combustion on the non fire side of the wall. The ratings for fire resistance and insulation should always be the same.

A product's literature may state that it is capable of achieving up to four hours, but it is the responsibility of contractors to check if that is achievable in their specific applications. The sort of details that the contractor must check are:

- For what substrate is the product suitable – solid or drywall construction?
- Does the drywall opening need to be framed out (letter boxed)?
- Does the thickness of substrate in which it was tested relate to the application?
- What services has it been tested around?

It is generally easier to fire-stop in solid wall construction compared to drywall. This is because a drywall will move in a fire and this movement can dislodge the fire-stops, compromising the compartment. In brick and block walls the key issues to look out for are that the products are capable of lasting for the requisite time and that they can accommodate thermal movement of pipes and ducts.

Following the British Government's White Paper on Fire Service Reform, in the UK the fire and rescue service is responsible for not only identifying the route cause of a fire, but additionally looking at how and why it might have spread. These investigations are carried out in order to uncover faults in both the design and installation of fire safety systems and can lead to contractors being liable to prosecution in both the criminal and civil courts.

So what are the pitfalls and how can they be avoided? It is generally easier to fire-stop in solid wall construction compared to drywall. This is because a drywall will move in a fire and this movement can dislodge the fire-stops, compromising the compartment. In brick and block walls the key issues to look out for are that the products are capable of lasting for the requisite time and that they can accommodate thermal movement of pipes and ducts.

- What is the minimum/maximum annulus of fire-stopping material that must be used?
- What pipe diameters and types of plastics has the fire-stop product been tested on?
- Can the product accommodate pipe/duct movement as a result of temperature changes and other movement criteria and still perform to its required ability in a fire?
- What additional restraints might be needed on services in order to prevent the fire-stop being dislodged?
- Does the product meet the requisite acoustic requirement of the wall/floor?
- Does the insulation material around a metal pipe need to be fire-stopped; most probably the answer is yes.
- Have dampers been installed in line with the fire compartment?
- Has the product that is intend to be installed ever been age tested, as it is impossible to

e Stopping

predict when a fire-stop may be activated. Age testing will give peace of mind that it will perform up to the time period stipulated.

It is the responsibility of the contractor to verify all these points and, if the answers are not immediately available from the product's literature, then copies of test reports and assessments should be obtained. In terms of products. there a many suppliers of proprietary fire-stopping systems. Look for a company that can offer adequate training and that has its products third-party certified.

oxygen that can fuel the flame and so the foam is able to withstand the passage of fire for four hours. However, if the hole is increased to 50mm and the wall thickness reduced to 100mm the foam can burn through in less than five minutes.

If a product is specified and installed in line with its third-party certified detail, this kind of life threatening mistake can be avoided. The most common fire-stop product certification marks to look out for are Certifire, LPCB and IFC Certification.

Third-party product certification schemes regularly assess that the product sold is manufactured to the specification used in the original fire test, and that nothing has changed that might affect the performance of the product. They will also be application specific in order to ensure that products are only used in a configuration that will meet the integrity and insulation performance achieved in the fire test.

Again referring to the UK, Approved Document B is the British Government's guidance document for fire safety in the construction of buildings. This document, together with the UK Insurers Essential Principles Document and the Regulatory Reform (Fire Safety) Order guidance documents all recommend that products used for fire protection measures should be subject to independent inspection and certification.

Due to the lack of knowledge at compartmentation design stage of the size and types of services that will pass through a fire-rated floor or wall, most specifications will consist of an instruction to reinstate the compartment to the recommended fire integrity and insulation, rather than mention specific products. This can potentially lead to incorrect or inferior products being installed.

Third-party product certification schemes regularly assess that the product sold is manufactured to the specification used in the original fire test, and that nothing has changed that might affect the performance of the product. They will also be application specific in order to ensure that products are only used in a configuration that will meet the integrity and insulation performance achieved in the fire test.

A very good example of a product that is often misused as a passive fire stop is PE "Fire Rated" Foam. Guidance on the can will often state that the product is able to achieve a four-hour fire rating. However, on inspection of the original fire test, it can be seen that this type of product will usually be tested in a 15mm gap in a solid wall that is over 200mm thick with no services passing through it. The limited size of the hole restricts the amount of

The final pitfall to look out for is the practice of patressing. This is where off-cuts of plasterboard are used to either reduce a hole size prior to fire stopping the penetration with mastics or, in many cases, the plasterboard is cut tight to the services and then glued in place using a fire-rated mastic.

The Building Regulations for England and Wales are clear. For a solution to be acceptable it must be shown by test to work. There are recommendations made by the plasterboard manufacturers on how patressing should be used. These involve fixing the patch back to the studs either side of the opening with plasterboard screws at 300mm centres, with the addition of metal cavity fixings being used around the services. Even these onerous details have not been proven by test to work and so the ASFP (Association of Specialist Fire Protection) is clear on this matter – patressing is not a recognised way of fire-stopping.

If this all sounds too complicated and risk laden, then the ASFP would strongly recommend that life safety packages such as fire stopping should be sub-contracted to third-party certified installers. These companies not only demonstrate expertise in the installation of these products, but also have their work certificated by independent certification bodies that in turn are, in the UK, accredited by the United Kingdom Accreditation Service (UKAS).

Should the decision be taken to sub-contract this package then it is imperative for site productivity that the dry-liner prepares any openings in fire-rated compartments, ready for the services to pass through prior to the fire stopping taking place. This will normally involve the framing out of the opening in accordance with the fire-stop manufacturers' recommendations. IFP

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Teamwork Works

A while back, I attended a short Outward Bound team-building course designed to demonstrate how, when people work as a team, the desired results can be achieved with greater speed and efficiency.

By Wilf Butcher

Chief Executive, Association for Specialist Fire Protection

Obvious, you may say, but such courses are designed to demonstrate that one person's approach to achieving the goals can be very different to the next person's. Until they "see the light" and start communicating with each other, the goal can never be effectively achieved.

Even when the team starts to work in a more efficient manner, the whole process falls apart as soon as a number of teams are brought together to achieve the set objective. Self interest takes control, and the whole exercise becomes highly competitive, with the result that everyone loses.

Of course, these were just games. But the message was very real – work together or collectively fail.

As the course progressed, the objective became clear to all. But the real challenge for those attending was how to take away the lessons learned and convert them into practical benefit when addressing the issues that each faced within his or her industry.

The fire protection sector is not one generally associated with fast or dynamic change. So, it could be argued that the need for all those involved in the business of fire protection to come together and work as a team, is not an issue of any real importance. Evolution, rather than revolution, has always been the order of the day.

I for one no longer believe this to be the case, and I know that many of my fire industry colleagues from the passive, active and firefighting sectors share my thoughts on this matter.

It could be argued that the tragedy of the Lakanal House fire in London – when six people were killed and at least 20 were injured when fire spread through a number of flats in a twelve-storey tower block – may prove to be a catalyst that will bring together the fire protection community, at least in the UK. The disaster may prompt recognition that such fires will continue to happen unless the fire protection industry learns to operate as a single entity to identify, in a non-partisan way, the issues that need to be addressed, and pursue the appropriate way forward.

But, as demonstrated in my team building exercise, we are but one element in the process. So, unless we can encourage the other "teams" – Government, legislators, insurers, designers, builders and building owners – to get involved and join with us, our industry goals will not be realised.

Firstly though, we need to agree what our collective goals should be. What are the issues that we need to address? Here are a few suggestions. I am sure you can add your own.

- To what depth should specifiers understand the detail of appropriate specification when considering the fire protective needs of their design, particularly when adopting a fire engineering approach? Who should take responsibility for this process?
- We are advised that there will be no changes to the Building Regulations of England and Wales' Document B until 2013, and that these will not be implemented until 2016. Is this the right approach? If changes are not made, how can we ensure that the current Regulations reflect and direct the need for correct selection or installation of appropriate fire protection measures? For example, while we continue to allow totally unqualified and untrained individuals, or companies, to install fire protection products and systems, the industry will continue to lose the battle for appropriate minimum standards.
- How can the industry ensure the main contractor understands and respects his legal liability and obligations when appointing a contractor to carry out the required fire protection works, particularly if the chosen contractor carries no third-party certification?
- In the UK, the Fire Safety Order gives a guidance framework in theory, but how can this be made to work in practice? Driven by case law, it turns the onus of responsibility onto those who do not have the knowledge to determine appropriate fire protection measures.
- Undertaking a risk assessment currently requires no qualification, but these are the very people/organisations giving assurance to the Order's "Responsible Person" that the building is fit for purpose. This is a real issue for those who are qualified by experience.
- The process of building inspection does not require detailed investigation of the fire protection measures in a building and that they are fit for purpose. Should the fire industry therefore be looking to a "Permit to Occupy" approach?

The tragedy of Lakanal House and the subsequent fires are a wake-up call to all those involved in the process of fire protection. The danger is that, with time, they will disappear into the annals of history, buried under the weight of justification from all quarters. So much so that any attempt to affect the status quo and raise the bar in fire safety, will place an unnecessary burden on UK Plc.

If team building on a sunny afternoon with like-minded people showed itself to be a challenge, then the one we face on just the issues raised above is positively herculean. But, as an industry, face them we must. IFP

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Standards Round-Up

The recent NFPA Technical Meeting in the USA accepted a number of Standards, several of which are going to impact on the provision of fire protection.

Inspection, testing, and maintenance of water-based fire protection systems

NFPA 25 (Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems) sets down the minimum requirements for the periodic inspection, testing, and maintenance of water-based fire protection systems for both land-based and marine applications. It does not though address all of the inspection, testing, and maintenance of electrical components of the automatic fire detection equipment for pre-action and deluge systems, which are covered by NFPA 72 (National Fire Alarm Code).

The types of systems dealt with in this Standard include – but are not limited to – sprinkler, standpipe and hose, fixed water spray, and foam water. Water supplies that are part of these systems, such as private fire service mains, fire pumps and water storage tanks, and valves that control system flow are also included. The Standard does not apply to sprinkler systems designed and installed in accordance with NFPA 13D (Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes).

Road tunnels, bridges, and other limited access highways

NFPA 502 (Standard for Road Tunnels, Bridges, and Other Limited Access Highways) provides fire protection and fire life safety requirements for limited access highways, road tunnels, bridges, elevated highways, depressed highways, and roadways that are located beneath air-right structures. It does not apply to parking garages, bus terminals, truck terminals, or any other facility in which motor vehicles travel or are parked.

Ventilation control and fire protection of commercial cooking operations

NFPA 96 (Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations) provides the minimum fire safety requirements – preventative and operative – relating to the design, installation, operation, inspection, and maintenance of all public and private cooking operations. The Standard applies to residential cooking equipment used for commercial cooking operations, but does not apply to cooking equipment located in a single dwelling, to facilities where only residential equipment is being used, where fire extinguishers are located in all kitchen areas in accordance with NFPA 10 (Standard for Portable Fire Extinguishers), where the facility is not an assembly occupancy, or where the authority having jurisdiction has approved the installation.

The requirements include – but are not limited to – all manner of cooking equipment, exhaust hoods, grease removal devices, exhaust ductwork, exhaust fans, dampers, fire-extinguishing equipment, and all other auxiliary or ancillary components or systems that are involved in the capture, containment, and control of grease-laden cooking effluent.

Examples of operations that might not require compliance with this Standard include day care centres' warming bottles and lunches, therapy cooking facilities in health care buildings, churches and meeting operations that are not cooking meals that produce grease-laden vapours, and employee break rooms where food is warmed.

Water-cooling towers

NFPA 214 (Standard on Water-Cooling Towers) applies to fire protection for field-erected and factory-assembled water-cooling towers of combustible construction or those in which the fill is of combustible material. It cites a number of factors that should be considered in determining the extent and method of fire protection required for both induced-draft and natural-draft cooling towers: However, when a cooling tower's structure, fan and distribution decks, louvers, and fill materials are all non-combustible materials, no fire protection is required. IFP

More information on these, and the other recently accepted NFPA Standards, can be found at www.nfpa.org/aboutthecodes/

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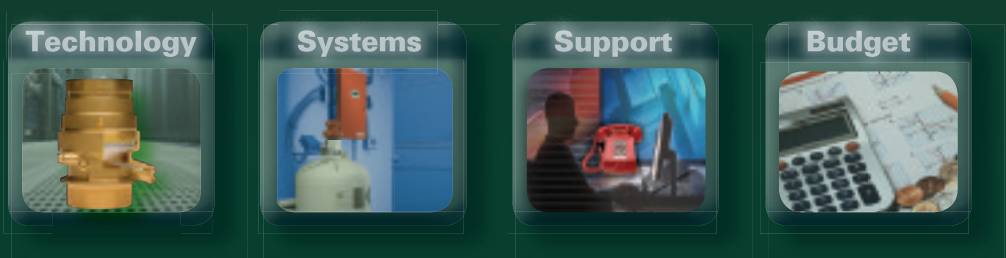

Technology
Systems
Support
Budget

The advance of Detection

Video image detection (VID) has progressed tremendously over the last ten years. The technology has evolved from a concept to a prototype implemented by a few progressive early adopters, to a refined, listed and code-recognized product with applications ranging from cultural properties to nuclear power plants. The speed of the technology's progress and acceptance has benefitted from its use of video and computer components widely used in other industries, such as imagers and processing chips used in high end CCTV security cameras and HDTVs. This article will review the history of the technology's progression and the evolution of the VID industry.

James "Andy" Lynch

Technical Services Manager, Fike Video Image Detection

A recent 2010 NFPA Suppression and Detection (SUPDET) conference presentation given by Bob Elliott, a senior engineering specialist at FM Global, identified the 4 stages of VID historical development. The presentation was entitled "Video Image Detection, No Longer a Supplemental System". The four stages are identified as:

Stage 1 – Flame only
Stage 2 – Smoke only
Stage 3 – Combination Flame and Smoke
Stage 4 – Single Package Combination Flame and Smoke

These stages identify the evolution of the technology, but what can be overlooked is why it has progressed in this fashion. Stage 1 to this day competes with the traditional UV and IR optical flame detectors (OFD). Rather than using a UV or IR sensor, the Stage 1 VID flame detector uses a CCD imager, the visual spectrum, and pixel analysis to identify a flaming fire. The unit itself looks, feels, and provides alarm contacts like any other OFD but also provides a video signal. The units are therefore treated as OFDs with approval and installation occurring with little or no change to the standards and fire code.

The next stage was the development of the video image smoke detector (VISD). These systems are server based in that they receive analog video through a BNC camera connection and then process the video feeds on the server. This provides an alarm in the form of dry contacts located on the server. These systems generally handle 4 to 8 cameras at a time. At the time of the inception, these systems were not recognized by code. However, due to the supplemental use in the field FM took the initiative and began to test and approve these systems, setting expectations for a properly installed VID system.

The benefits of this technology were quickly recognized by early adopters. The detectors can identify smoke in large volume spaces (even if stratification took place), provide video for situational awareness, and provide large coverage areas with minimal and easily accessible camera locations. However, these systems also have several drawbacks. The combination of the server and cameras makes for a bulky, power hungry detector. A typical camera consumes 5 Watts of power, while the servers can consume another 200 W. This requires tremendous amounts of battery power to provide an uninterrupted power supply

Video Image

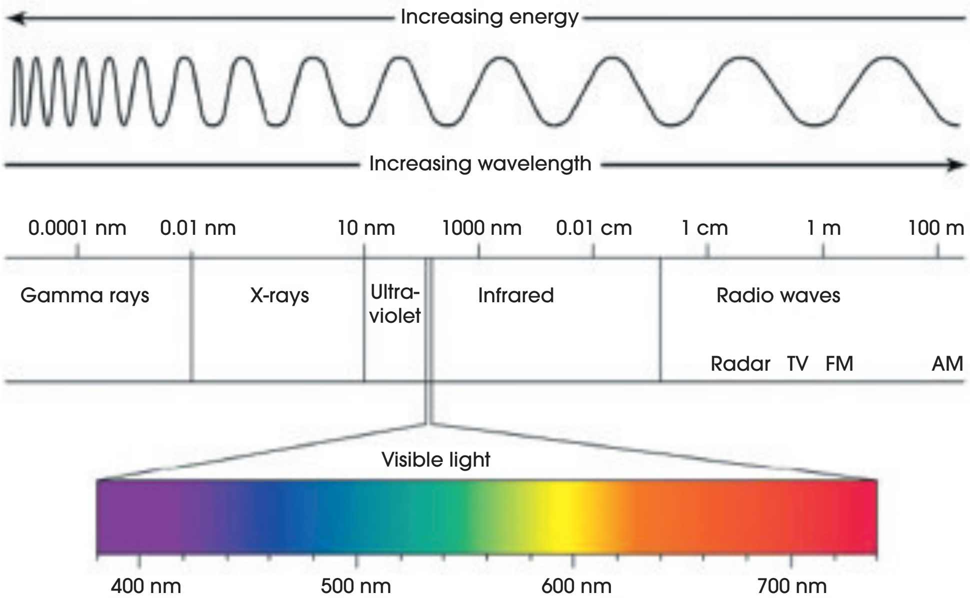


Fig 1 – Image of the electromagnetic spectrum that includes Ultra-violet (UV), Visible light, and Infrared (IR) spectrums all used in the fire protection industry for the purpose of detection

(UPS). Each camera also needs a dedicated continuous Siamese coax and power line between the detector and the server, increasing installation costs.

Stage 3 combined the two algorithms (fire and smoke) into one server based system that can then be tested as a flame and smoke detection device. As supplemental installations continued and the NFPA revision cycle for the 2007 NFPA 72 code came around, it was advantageous to provide guidance in the code for future installations. The code insured a minimum set of requirements be fulfilled. One such requirement is that only listed systems be installed. At the time only Factory Mutual approved video image detection systems by using modified ANSI 268 and FM 3260 standards. NFPA 72 also required an uninterrupted power supply. For the server based systems of the time, this required a large amount of batteries to meet the necessary 24 hours of power required by NFPA. Communication integrity was required, so the systems had to monitor their camera feeds for interruption and ensure an alarm signal reached the monitoring point. NFPA also requires these systems use a performance-based design. Because of the wide range of performance, architecture, and lighting requirements between each system they will most likely remain performance based within the code. With the introduction of the technology into the NFPA code and FM's ability to approve systems, supplemental installations continued. Due to the cost, privacy issues, and the technology's ability to cover large volume spaces, VID systems (both smoke only and fire & smoke) are generally installed in only non-residential applications such as power plants, warehouses, and manufacturing facilities.

Stage 4 is the most significant stage to date as it combines the two algorithms into a single self contained device. This advance was possible due to increases in computational power over time and advances in the video security industry, especially the migration toward IP based systems. This stage put the analytics at the edge of the network, providing a more reliable system. It also enabled LED indicators and contacts to move to the device location – a configuration more similar to conventional detection devices. With the contacts on the device the communication loop is direct to the Fire Alarm Control Panel and therefore the communication integrity does not have to take into account the sometimes numerous and long runs of coax from the cameras to the server. And because the device can sit directly on the FACP loop, the NFPA code mandated UPS only has to ensure the cameras (~5 W) stay active rather than the cameras and servers (~200 W) for 24 hours.

Until this stage UL had not listed any VID devices nor did a UL standard exist that VID systems could pass. One hurdle was UL 268, which has been used to test beam, spot and air aspiration systems, required detection within a predefined obscuration limit. The conventional technologies being tested relied on the smoke reaching the sensor, therefore an obscuration measurement can be made at the location of the detector or sampling port to ensure detection within the bounding limits. Video "sees" the smoke – in many instances before it has reaches the obscuration measuring point in the UL268 room. In other words, tying the pass/fail criteria to a point measurement was inappropriate for the 3 dimensional VID detectors. UL has since created

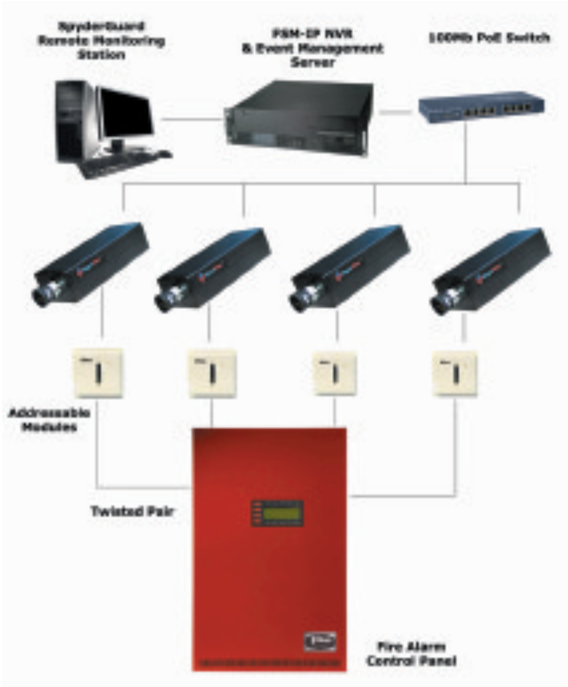


Fig 2 – IP camera system architecture with connection through addressable modules to the FACP and on to a Local Area Network (LAN) for video and alarm storage and viewing

UL268B which uses the same test sources and room dimensions but removes the criteria that ties obscuration to the detection, and instead uses a time to detection. FM, which has traditionally tested the systems to modified ANSI/UL 268 and FM 3260 test standards, has begun the process of creating a new Video Image Detection standard (FM3232). This standard will better define the expectations of a VID detector and take into account the advances in the technology, as well as the knowledge gained by FM, manufacturers, and industry personnel.

Currently VID systems that are being installed to code take advantage of the new IP camera system flexibility. The cameras are placed in fixed positions and attached to a 12-24 VDC power supply. This can come from the Fire Alarm Control Panel (FACP) or a listed power supply. The cameras are then monitored by the FACP using dry contacts attached to an addressable module that indicate when the camera is in a trouble or alarm condition. In addition, the cameras are attached to the Local Area Network (LAN) using the RJ45 jack. This can be attached to a Power Over Ethernet (POE) network switch to provide a redundant power source. IP video and alarm information is then transferred over the LAN to a server for recording purposes. This allows the user, whether it is the building manager, owner, distributor, AHJ or fire personnel, access to the archived video and alarms. User interfaces usually allow easy access to this information as well as floor plans with camera locations, and live video. In certain situations, AHJs can approve the replacement of a traditional code mandated alarm system with a VID system. Some installations forgo the code required power from a listed supply and FACP, instead relying on the POE switch with battery backup and user interface monitored at a control room or security desk. This configuration is generally only used for supplemental purposes.

Lighting

Lighting has been an important issue over the life span of video image smoke detection systems. Critics point to the necessary illumination needed to see a smoldering smoke source. Since flaming fires produce light, additional illumination does not need to be supplied for flame detection to occur. However, all video image smoke detection systems need some form of illumination to function correctly, much like how air aspiration systems require a fan to pull the smoke back to the detector. If the fan were to malfunction or the piping became blocked, the smoke would no longer travel through the piping and the smoke would remain undetected. It is for this reason that air sampling systems supervise air flow. In a similar fashion VID systems will fault if the light level gets to low, or if the camera is covered, dirty or out of focus. These conditions need to be supervised.

The supplied illumination can be either Infra Red (IR) or white light depending on the system. Statistics show that a majority of fire incidents reported to the fire department occur at night when a business is closed or has a reduced staff on hand. A challenge to the end user and installer is to provide proper illumination so that the VID system is effective on a 24 hour, 7 days a week, 365 days a year basis.

There are advantages and disadvantages with each illumination type (IR and White Light). A foot-candle (FC) is the English measure for light intensity. Lux is the metric equivalent with 1 FC = 10.76 Lux. Both are measurements of illumination produced by one candela or lumen over one square foot or meter respectively. As Lux and FC are measurements of visible light, and by definition IR produces invisible light, how do you measure the appropriate IR illumination level? In order to measure light radiation in terms of Watts it is necessary to use a radiometer which typically exist only in laboratories and are usually priced beyond the means of normal installation companies. On the other hand, white light is easily measured with a calibrated light meter.

White light illumination provides color images whereas IR can only deliver a black and white image. This is due to the fact that IR illumination is light which the human eye cannot see but that a monochrome CCTV camera can. In addition, switching between IR at night and white light during the day can result in a focus shift. The different wavelengths create different focus points through the lens onto the camera chip. This can lead to a loss of image focus in dark conditions, particularly if the camera is set up during day time operation. IR light used in CCTV applications is in the 700 to 1,100 nm range – just beyond the visible spectrum, Fig. 1. As white light is visible to the human eye we have natural protection against an overexposure to white light. On the other hand because humans cannot see IR light our eyes cannot automatically adjust to overexposure and potential eye damage. Applications that require covert surveillance or where no light is allowed due to light pollution on light sensitive materials, are ideal for IR. However the majority of installations are better served using white light illumination as it provides a higher level of safety and security. In addition, system performance is not changed and light levels can be as low as 1 ft-candle, the emergency light level set by NFPA standards.

VID systems without IR filters can also be blinded by large fires in the field of view. These fires produce a large amount of IR that can flood the imager, creating a blinding affect. The camera may generate a fault condition, but it will also miss the fire source. IR filters prevent this but also make it impossible to use IR illumination for smoke detection.

Using white light provides more options to the end user because it can be supplied by a number of sources including incandescent, fluorescent, High Intensity Discharge (HID), or LED lamps. LEDs are the fastest growing lighting solution for VID applications. They are extremely efficient and offer tremendous reliability. LEDs may cost more initially, but they offer the lowest possible running cost (lower wattages) with longer operating life (up to 10 years).

Some VID systems have built in illuminators attached to the camera. In many cases, a single source will not provide the necessary and proper lighting for a facility and may be unnecessary. In addition, a single high powered light creates large pockets of light with dark areas in the image. Lighting should be placed to provide uniform illumination within the cameras field of view.

Another advantage of white light illumination is that many facilities already have the required 1 FC of illumination. The life safety code (NFPA 101) Section 7.9.2 describes the required emergency lighting levels for safe egress in case of loss of power during an evacuation. The code states that "emergency illumination shall be provided for not less than 1.5 hours in the event of failure of normal lighting. Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 1 FC (10 lux) and, at any point, not less than 0.1 FC (1 lux), measured along the path of egress at floor level. Illumination levels shall be permitted to decline to no less than an average of 0.6 FC (6 lux) and, at any point, no less than 0.06 FC (0.6 lux) at the end of the 1.5 hours. A maximum to minimum illumination uniformity ratio of 40 to 1 shall not be exceeded."

No matter which video system is installed or its purpose, proper camera placement and illumination is vital. Video image smoke and fire systems rely on proper illumination that generates uniform and adequate levels of light.

Video image smoke and fire detection has evolved a long way in a relatively short period of time, and will continue to do so. Higher processing speeds, increase storage, mega pixel imagers, and advanced analytic capabilities are already being considered for future development and inclusion. The increased use of networks and the impending demise of the Plain Old Telephone Service (POTS) will allow for greater access to information provided by fire alarm and suppression systems. It is necessary that the fire codes, listing agencies, and customers embrace and define the use of new fire equipment and technologies in order to support the changing fire industry. IFP

James Lynch has been employed by Fike Video Image Detection since December 2005, and has served as the manager of technical services. As the manager of technical services he is responsible for fire related research, the development of Video Image Detection (VID) technologies, approvals testing, certification training and VID system implementation. He is a member or the Salamander Honorary Fire Protection Engineering Society, the National Fire Protection Association, the Society of Fire Protection Engineers, and the International Association Fire Safety Science. Mr. Lynch's educational background includes: a B.S. in mechanical engineering and an M.S. degree in fire protection engineering from WPI.

The Application of Science

Since prehistoric times, when people first extinguished fires with dirt and water, mankind has looked to science to develop new and improved technologies for managing and controlling fire. Al Thornton plots it growth.

By Al Thornton

In today's complex, interdependent electronic society, the need to effectively manage risk and control fire is critical to modern life. As our need for fire protection increases, the criteria for choosing a practical, viable clean agent becomes more complex as well. Understanding the science that drives clean agent fire protection development is crucial to making sound, responsible choices for protecting today's critical infrastructure and ensuring business continuity.

Fires happen every day. In the most critical facilities and installations, clean agent technologies are often the best tools for protecting lives, valuable or sensitive assets, and maintaining operations. They offer the best balance between performance, safety, economic value, and environmental responsibility for the special-hazards fire protection industry.

In the early 20th century, several different halogenated hydrocarbon molecules were used to protect mostly military vehicle applications; ships, aircraft and tanks. Carbon tetrachloride (Halon 104 or CCl_4) was the first "clean agent" put into use, and by 1910 portable carbon tetrachloride extinguishers, tested by independent agencies, had appeared.

Carbon tetrachloride was soon followed by methyl bromide (CH_3Br or Halon 1001) and chlorobromomethane (CH_2ClBr, Halon 1011 or 'CB'); both agents being employed in military aircraft and ships during World War II. While these options served as very effective fire fighting agents, they exhibited high toxicity and were unsafe for use around people.

In 1947, the Purdue University Research Foundation conducted a research program evaluating the performance new-candidate fire extinguishing agents. At the same time, the U.S. Army Corps of Engineers undertook a project to evaluate the toxicological properties of the same compounds. These studies extensively characterised over 60 candidate extinguishing agents according to fire efficacy, toxicity, corrosivity, electrical conductivity, and the effect of temperature and different fuel arrangements on agent effectiveness. From these review candidates, four agents were selected for further study – Halon 1301, Halon 1211, Halon 1202 and Halon 2402.

The results of the Purdue Study were:

Halon 1202.	Most effective and most toxic; the U.S. Air Force chose Halon 1202 for military aircraft engine protection.
Halon 1301.	Second most effective, with excellent toxicity; U.S. Army chose for portable extinguishers; FAA selected for commercial aircraft engines.
Halon 1211.	Selected by the UK for aircraft and portable applications.
Halon 2402.	High toxicity, liquid agent; selected by Russia for total flooding and portable applications.

In the 1960s, DuPont introduced Halon 1301 (CF_3Br) to the commercial fire protection market using legacy CO_2 equipment and technology. Hailed as a "wonder gas," colourless, odourless, and safe for use around people, it left behind no residue making it an ideal product for the nascent computer and telecommunication industries. By 1970 NFPA had created a design standard, NFPA 12A, and the modern "clean agent" industry was in full swing.

The extremely efficient fire extinguishing properties of the Halons cannot be fully explained by consideration of the traditional fire triangle, which tells us that fire can be extinguished by the removal of heat, fuel or oxygen. An additional factor must be added to explain the high efficiency of the Halons – that of chemical chain reaction – leading to the concept of the fire tetrahedron. In addition to the methods of heat, fuel or oxygen removal, fires can be extinguished by inhibiting, or interrupting, the chemical chain reaction which produces the fire.

The Halons extinguished fire predominantly by this "chemical" mechanism, which turned out to be an extremely efficient method. This mechanism involves the removal of the key fire species, which are responsible for keeping the chain reaction of the fire going – Halon serves to "break" the chain reaction. The key chemical species responsible for maintaining the chain reaction in a fire are the hydrogen (H), oxygen (O) and hydroxyl (HO) fragments produced in the fire. Halon 1301 reacts with hydrogen to produce the CF_3 fragment and HBr – the "magic bullet" which slays the fire: HBr reacts with H and HO, removing the two species most responsible for maintaining the chain reaction, and breaks the chain reaction, shutting down the fire.

The 1980s introduced concerns about ozone depletion from chlorofluorocarbons and Halons and the subsequent passage of the Montreal Protocol. The key to the highly efficient extinguishing properties of Halon – the presence of a bromine atom in its structure – also led to its demise, as bromine is also a powerful ozone depleting species. The Montreal Protocol initially froze Halon production at 1986 levels, and ultimately eliminated the production of new Halon in developed countries by 1992. Today, many Halon systems remain in place protecting critical facilities throughout much of the world.

With pressure to find a new "wonder gas" – with the added requirement of zero ozone depletion potential – the fire suppression industry mobilised and introduced a wide variety of alternative agents for both Halon 1301 and Halon 1211. Fire extinguishing theory in hand, one can begin to deconstruct the building blocks of these clean agent extinguishants, comparing, contrasting and evaluating additional alternatives and options. The first schism in next-generation alternatives came between "chemical agents" and "physical agents". Chemical agents extinguish fire by interfering with the chemistry of the fire. Physical agents extinguish fire via physical mechanisms such as oxygen reduction or heat absorption.

As already explained, Halons are "chemical agents" that extinguish fires by interfering with the chemistry of the fire; removing the key flame species and breaking the chain reaction of the fire. Physical agents do not interfere or become involved in the chemistry of the fire; they extinguish fire through physical mechanisms, such as oxygen depletion or heat absorption. Inert gases and carbon-based clean agents are both physical agents, but extinguish fire by different physical mechanisms. The inert gases extinguish fire by oxygen reduction, whereas the carbon-based agents extinguish fire via heat absorption.

The inert gases – nitrogen, argon, and a variety of inert gas blends – act as physical extinguishing agents, reducing oxygen levels from an ambient 21 percent-by-volume down to below 14 percent-by-volume, essentially starving the fire of enough oxygen to continue burning. Oxygen reduction is an inefficient method of fire extinguishment and, as a result, inert gas systems require large design concentrations, typically in the order of 40 percent-by-volume or more of the protected space.

Inert gases cannot be compressed and stored as liquids, but can be stored only as gases. As a result of their low efficiency and inability to be stored as a liquid, inert gas systems require a large number of storage cylinders. The number of storage cylinders required can be reduced somewhat by resorting to high pressure (for example, 300 bar) systems, but this requires the utilisation of high-pressure storage cylinders and high-pressure

piping and manifold systems. The inert gas extinguishing agents themselves are readily available, low cost, industrial gases, but the additional hardware requirements often result in a higher system cost and a much larger site footprint for inert gas systems than for other clean agents.

The fundamental construction of a carbon-based clean extinguishing agent consists of a carbon base molecule with halogens substituted for various hydrogen atoms. The introduction of bromine atoms into the carbon base greatly improves the fire extinguishing effectiveness. However, this can also lead to increased toxicity and reduced chemical stability; most importantly, the introduction of bromine results in a molecule characterised as an ozone depleting substance (ODS), and hence subject to the controls of the Montreal Protocol.

The introduction of chlorine into the carbon base results in a moderate increase in fire extinguishing effectiveness, and lessened effects on toxicity and stability compared to bromine. However, the chlorine atom is efficient at depleting ozone, and the resulting molecule will be classified as an ODS, subject to the controls of the Montreal Protocol.

The introduction of fluorine into the carbon base has four desired effects: increased fire extinguishing effectiveness, increased chemical and physical stability, reduced toxicity, and reduced boiling point. Unlike bromine and chlorine, however, fluorine does not participate in ozone depletion and hence these compounds containing carbon, hydrogen, and fluorine atoms (hydrofluorofluorocarbons or HFCs) have zero ozone depletion potentials (ODPs).

Using the science and chemistry of clean agents, DuPont set about developing a family of physically acting fire extinguishing agents designed to balance the needs of the market with the competing demands of life safety, fire performance, environmental acceptance, and suitable physical properties. The results of this extensive development program are four halocarbon extinguishing agents targeted for specific user requirements. None of these clean agents contain bromine or chlorine, achieving the goal of zero ODP. All of these clean agents are physical agents, extinguishing fire via heat absorption.

DuPont™ FE-13™ (HFC-23, CF_3H)

The simplest of the molecules, FE-13™ offers some key physical features that make it a unique solution for certain difficult applications.

Due to its very low toxicity, FE-13 can be used in occupied applications that require a very high design concentration, such as difficult flammable liquid and gas extinguishment and inertion hazards, or in areas where the volume or temperature of the protected space varies dramatically, such as cargo holds. The low boiling point of FE-13 allows its use in applications involving low temperatures, such as environmental test chambers, turbine enclosures, railroad locomotives, and mining equipment. The low boiling point of FE-13 also makes it more effective in the protection of areas with high ceilings.

DuPont™ FE-25™ (HFC-125, CF_3CF_2H)

FE-25™ is characterised by flow properties very similar to those of Halon 1301, and was selected by the U.S. Department of Defence to replace Halon 1301 in engine nacelle applications in new aircraft, and by the U.S. Navy in the engine nacelles of existing aircraft.

FE-25 is effective for many surface fires and most solid combustible materials and is used in grain elevators for explosion suppression. Originally provided as a close replacement for existing Halon 1301 systems, it is now also used for new systems.

DuPont™ FE-36™ (HFC-236fa, $CF_3CH_2CF_3$)

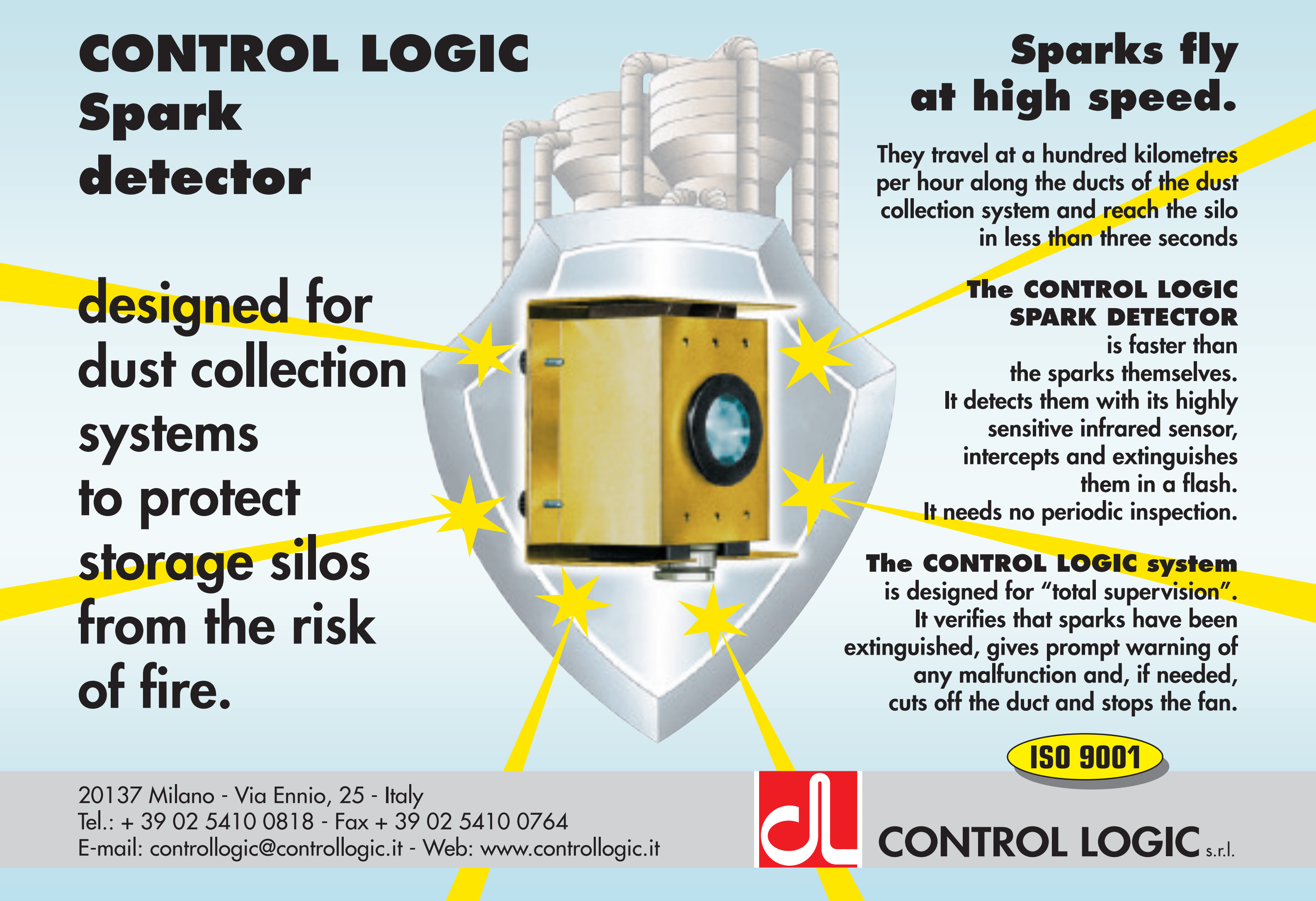
FE-36™ is proving to be the standard in-kind replacement for Halon 1211 in portable extinguishers. FE-36 is characterised by lower toxicity compared to Halon 1211, and has zero ozone depletion potential.

DuPont™ FM-200® (HFC-227ea, CF_3CHFCF_3)

FM-200® is the most frequently specified and installed clean agent in fire protection systems. It is safe for use in Class A ordinary combustible material applications and Class B flammable liquid and gas applications (Classes B and C in Europe, Australia and Asia), where people are normally present, the so-called "normally occupied spaces". FM-200 can be used where conventional extinguishing agents such as water, dry chemical, and carbon dioxide are unsuitable. These situations exist where there is sensitive electronic equipment servicing a critical operation, where a loss would include the equipment and the cost of business interruption.

Other situations involve delicate or irreplaceable materials such as those found in museums, libraries and historical sites. FM-200 is arguably the most cost effective clean agent extinguishant for total flooding applications, including computer rooms, telecommunication facilities, semiconductor manufacturing facilities, data processing centres, clean rooms, and industrial process control rooms. Other examples of applications include marine engine compartments, petrochemical facilities, chemical storage rooms, paint lockers, and other applications where hydrocarbon-based materials are present. IFP

Al Thornton has sales responsibility for the fire suppressant business of DuPont
www.DuPont.com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St Pancras Platform

By Paul Bryant

Chairman of the Rail Industry Fire Association

Railway Fire Safety – As I See It

The unique fire safety challenges posed by railway stations around the world need to be more holistically approached. So says Paul Bryant, Chairman of the Rail Industry Fire Association.

London recently experienced a major fire at a main railway station and while the fire protection systems at the station worked as intended, this still did not prevent wide scale damage. However, it was not the damage that was the main issue, but the fact that the fire disrupted the journeys of thousands of people for many hours; yet another example of how a fire in a railway station can have real or potentially devastating consequences. While most of the travelling public are unaware of the implications of a fire, it is vital that those working with for and in the railways are.

More people want to travel more often. Consequently, the strain on rail networks around the world will continue to worsen, and the continuing requirement to explore bolder railway station designs puts even greater pressure to adopt an effective performance based approach to fire safety. The traditional prescriptive approaches for fire safety in buildings have been replaced by the requirement for a "free thinking" scientific approach, which surely demands that the skills of qualified or experienced fire engineering specialists need to be used and not those who are just happy to follow a set of rules.

One of the issues affecting railway station design and use is the need to gain an understanding of how performance-based fire safety engineering approaches can assist in providing effective fire strategies. Hence, any fire safety engineered design for railway stations invariable has to consider the large open areas that are essential for the movement of large numbers of passengers, many of whom will make several stops inside the station for shopping, ticket collection and refreshment. It also has to address the fire risks posed by areas such as restaurants and fast food outlets, plant and control rooms, store rooms and waste collection areas.

The need to ensure controlled evacuation in the event of a fire or other emergency, particularly in these troubled times, is another major consideration, particularly given the fact that most travellers have little knowledge of the station environment and some have only limited understanding of the indigenous language. Finally, there is the ever present requirement to minimise business disruption due to expensive and distressing false alarms and ensure that the station is "back in business" as soon as possible after a fire. In short, it is essential that a more holistic approach is taken to fire safety in stations around the world, if nothing is to be overlooked.

Every station should have a distinct and specific fire strategy, and the specifics of each individual station should be presented in a similar way. This consistency of approach is vital when protecting the millions who use the rail networks, an imperative that led me to author the British Standard Specification PAS 911 on fire strategies, which was published in 2007 and is designed to be used internationally. This sets out the preparation of a fire strategy as a process, with key inputs and sub-strategy outputs, along with guidance on how to evaluate the factors associated with fire safety and protection. IFP

The Rail Industry Fire Association was formed in 1996 with the objectives of sharing information, experience and best practice in the management of fire safety throughout the railway industry. Its website is at www.rifa-rail.com

Paul Bryant is Chairman of the Rail Industry Fire Association
www.rifa-rail.com

Safety in Numb

By James Lane

Hilson Moran

Buildings are generally becoming larger and potentially more complex. Can we be sure that the principles of fire safety have developed in line with the changes and remain adequate when dealing with means of escape? James Lane gives a professional insight.

First we have to avoid a common misconception; what do we mean by large?

When anybody mentions large buildings we immediately think tall. However, a quick Internet search will reveal that the largest buildings in the world, in terms of occupiable space, are mainly linked with the aeronautical industry. Vast sheds used for the assembly of airliners and space craft. This has historically been the case since technology enabled powered flight and hangers were required to house airships and transatlantic aircraft. Even before the dawn of this brave new world it was the industrial revolution and the call for increasing mass production capability that gave us ever increasing factory buildings, with a population equivalent to a small town, but it was the need for property protection that led the insurance market to push for the development of automatic fire protection and the birth of sprinkler systems.

Since then, automation of the work force has reduced the number of people and even the space requirements for production facilities. But the large concentrations of people did not go away. They moved. Renaissance in our leisure time activities has led to larger public spaces such as sports arenas and, where a high street would have had individual shops, the street was covered over to create a single common space and purpose-built shopping malls have changed our retail expectations.

Nowadays, large buildings are a feature of all sectors of the built environment from industrial and warehouse, to leisure and retail, to residential and commercial. So what are the fire implications for these large buildings and how does increasing area affect means of escape?

How important is means of escape?

The provision for achieving evacuation from a building in an emergency is the fundamental feature of any fire strategy. All other fire design features have the underlying aim of maintaining conditions that will enable escape. In the UK the Approved Document system for compliance with Building Regulations states that:

"…the Building Regulations do not require anything to be done except for the purpose of securing reasonable standards of health and safety

ers

for persons in or about buildings (and any others who may be affected by buildings or matters connected with buildings)."

This effectively limits the Building Regulations for fire to dealing with matters of life safety. The benefits in protection of property are a happy coincidence rather than the main purpose.

Prescriptive codes will stipulate the number and dimensions of escape routes, the doors and stairs and the type of fire alarm required. Although it may not be clear from a simple set of rules, the purpose of specifying these parameters is to ensure that the provisions for escape will be suitable for the expected number of occupants.

Legislation has moved away from this prescriptive approach and has adopted a more risk-based philosophy. The Building Regulations are built to a set of functional objectives that require that "reasonable" provisions are made to achieve an acceptable level of safety". This has given rise to one of the fundamental principles of fire engineering and the engineered solution.

Available Safe Egress Time (ASET) is the time from ignition until conditions become untenable and injury or death may occur. Required Safe Egress Time (RSET) is the time taken from ignition until all the occupants reach a place of safety. While ASET is greater than RSET then it is claimed that the functional objective for means of escape has been achieved.

The process which greatly influences building design is one of a balancing act. On one side the provisions made for escape such as the number of exits and stairs and how wide they are allows estimates of the time taken for people to reach a place of safety. By increasing the number of exits and the aggregated width available for escape the time taken for people to flow through the system is reduced – RSET is lower.

On the other side of the equation, division into smaller fire compartments, limiting fire size through the application of sprinkler – or similar – suppression and the removal of heat and smoke are examples of the active and passive measures that can be employed to delay the onset of untenable conditions – ASET is higher.

So how does the size of the building influence this balance and what measures may be necessary to overcome any potential problems?

First of all it may be useful to examine what we mean by large. We could consider three categories:

- Large; but with low population (typified by industrial or warehouse facilities).
- Large; and with high population (sports, entertainment, transport interchange or retail).
- Large; tall with high population (commercial and residential).

Of course, it is possible to think of examples that do not fit with this way of thinking, or building types that blur the edges between the categories. But overall this serves as a convenient way to address the issues in dealing with large buildings.

Reducing the RSET

It is reasonable to assume that with increasing building area the time taken for the occupants to reach the exits will be longer. Implications for the required evacuation time include:

- Buildings with a large footprint area are likely to be deep plan. This means that the conventional travel distance limits to reach a fire exit may not be achievable.
- Large public buildings are likely to have a greater number of people. Sports arenas and shopping centres, exhibition halls and entertainment venues have the potential for large

area floor plans occupied to a much higher density
- Visitors to public buildings may be unfamiliar with the building and the emergency procedures. Motivation and managing the evacuation of a mass population from a building brings its own headache. Unfamiliarity means people are less likely to begin escape unless there is a direct and unambiguous instruction.
- After entering the escape system a prolonged route to reach the final exit may lead to fatigue and disorientation. This would be particularly the case for tall buildings where many flights of stairs could be off putting.

To deal with the problems encountered in large buildings, fire engineering offers a range of solutions aimed at reducing the time required to escape from the immediate danger from fire and its products.

Low volume population
In the industrial setting, factories and warehouses, while having a potentially large floor plan and volume, are likely to have a relatively low population density. The value in these buildings is in occupying the space with commodity, not people.

Standard guidance for means of escape assumes that there will be a period of queuing while people flow through the exit doors. However, where the population is small this may be greatly reduced and although it might take a little while longer to reach the exit (typical speed of travel often assumed to be about 1.2m/s) if there is no queue at the exit the overall escape time may be shorter than otherwise expected.

Phased evacuation
Where the building will have a much higher population than the industrial warehouse example above, one way to cope with the management of the number of people is to divide them into discrete groups and evacuate each group at different times.

Commonly used for tall buildings, this type of phasing will usually call for the immediate evacuation of the floor intimate with the fire. After this most vulnerable group are out of the danger zone the population of subsequent floors are evacuated in manageable chunks, usually two floors at a time, above the fire origin and then similarly for floors below, until the building is completely empty.

The advantage of this method is that generally the required stair width will be less than when compared with a simple simultaneous escape. It may also be possible, in certain cases, for the population remote from the fire to remain operational.

For very tall buildings it may not be reasonable to expect the occupants at the top to descend the stairs all the way to the bottom in a single journey. In this situation it may be necessary to provide refuge floors. These are selected floors in the building which will have higher fire precautions. Occupants evacuate from floors above to this level where lifts provided with special measures to keep them operational during a fire can be used to ferry them down to the ground floor.

Progressive horizontal evacuation (PHE)
Where the building is large by virtue of its plan area rather than height, a modification of the phased evacuation method is divide the footprint into a series of fire compartments. Again the most vulnerable occupants are moved in the first instance, but this time into an adjacent compartment horizontally.

Separated by fire resisting walls, this neighbouring compartment acts a refuge area. Organisation of the evacuation from this compartment can then

be done in an orderly manner outside of the immediate threat from the fire. Typically used in healthcare facilities, it is an additional benefit that occupants less able to effect their own escape unaided can be assisted during the secondary phase.

A similar method is applied to shopping centres. The central mall is considered to provide a place of relative safety and will usually be provided with some form of smoke control. Dividing the mall into smoke and evacuation zones makes it possible to evacuate one zone of a shopping complex at a time. Occupants in the mall are ushered into the neighbouring zone and the heat and smoke from a shop fire is dealt with by the venting.

Focused exit provision

Location and size of the available exits will also play a key part in an efficient escape strategy. It has been documented that human behaviour favours the familiar and where large public buildings have multiple exits people will often pass emergency exits in order to use the main entrance through which they gained access, or which provides the ready route back to the car. If the most favoured exits can be identified then measures to improve flow through the exits and management of the people after escape can be better focused.

Computer-based evacuation models that apply a probabilistic element into the predicted movement of a population, while theoretically applicable to a wide range of scenarios are put to the greatest benefit in these types of buildings.

Increasing the ASET

Extending the time before untenable conditions are reached is a valuable means of protecting the populations that require longer before escaping.

Increased compartment volume

A feature of industrial buildings is a general increase in the roof height to accommodate the industrial processes and machinery. The effect of this is to allow the heat from a fire to rise above the people and the volume created will take longer to become clogged with smoke. This may be sufficient enough delay before the heat and smoke build down to a height that would affect escape to allow all the occupants to evacuate the compartment safely.

However, industrial, and particularly storage, facilities have the propensity to contain a greater volume of combustible materials and contents of unusually high heat output, leading to larger fire sizes. A careful analysis of the rate that heat and smoke are generated is required to compare it with the benefits of the higher compartment height. Where there remains a problem an alternative strategy may need to be adopted.

Limiting potential fire size

Subdivision into smaller fire compartments will reduce travel distance to a place of refuge, as described above, and has the additional benefit of limiting the potential fire size and restricting the extent of damage.

Where subdivision is not possible, the application of automatic suppression has the significant advantage of keeping a fire relatively small, or even extinguishing it. There are many types of suppression, starting with standard water sprinklers thorough to stored liquid and gas agents and even a method of permanently reducing the oxygen content of the space to prevent ignition, and discussion of these could fill enough space for a separate article.

Venting

If the heat and smoke generated in a fire is released to atmosphere then the build up to untenable conditions within the space will be delayed, or even prevented completely. Theoretically, the conditions could be maintained within the limits of tenability indefinitely, allowing a greatly extended evacuation time. This might have more of a psychological effect on the occupants who may not be in a position of understanding the fire strategy and the calculations that have been applied to achieve this happy state.

Conclusion

Increasing building size brings with it a double-edge sword. The larger volume may mean that a fire has less immediate effect due to reduced proximity of the occupants with the products of combustion. But the resulting increase fire load and distance to an exit, potential population density and the problems of controlling a mass of people make means of escape the key consideration in developing a fire strategy.

Escape is likely to be the driving force that shapes major aspects of the building design. Provision of fire precautions is to achieve the functional objective of escape. IFP

James Lane is Principal Fire Consultant at Hilson Moran

Watermist Techno

By Rüdiger Kopp (Dipl.-Ing.)

Fogtec GmbH

Watermist technology was once seen as a niche product for special industrial risks, but today, says Ruediger Kopp, it is widely accepted as an alternative to sprinklers and gaseous extinguishing systems.

When watermist technology was "rediscovered" in the 1980s, it was seen mainly as a niche product for special industrial risks, such as protection of turbines, generators and other pieces of machinery. Today, however, watermist is accepted widely as a viable and effective alternative to gaseous extinguishing systems. In the marine industry, its benefits have been transferred from machinery space protection to accommodation areas where, traditionally, conventional sprinkler systems have been used.

Indeed, marine applications were the first where standards for testing, approval and installation of watermist systems were developed. The IMO (International Maritime Organisation) standards for machinery spaces and accommodation areas have been a good basis also for land-based applications, and still are used as a reference for the definition of fire scenarios in land-based watermist standards.

Watermist technology now has a firm place in the fire protection system market, with applications spanning from the protection of machinery containing fuels and lubricants, to cable tunnels, within the food industry, hotels, archives, museum, high-rise buildings, hospitals, laboratories, hotels and heritage buildings. Its use is also becoming widespread in the automotive and power generation sectors, for the protection of test cells, paint areas, hydraulic risks, generators, turbines and storage facilities. In the past few years, sophisticated and innovative fire protection solutions have been developed based on watermist technology that ensure highest possible level of safety where, previously, no appropriate solution was available.

Standards and fire tests

Since watermist combines the fire fighting effect of both conventional gaseous suppression and water sprinkler systems, it can neither be designed nor approved based on the standards applying to "conventional" systems. In their place, there are now a number of standards that apply specifically to the design and approval of watermist systems.

Among these, those that are most referenced internationally are: the IMO standards; NFPA 750 (Standard on Water Mist Fire Protection Systems); ANSI FM 5560 (American National Standard for Water Mist Systems) from Factory Mutual; and the European CEN TS 14972 (Fixed firefighting systems. Watermist systems. Design and installation). Based on these international standards, national guidelines and standards are under development, or have already been published by organisations such as VdS in Germany, APSAD in France and BSI in the UK.

All standards have in common that for watermist technology the required nozzle type, droplet distribution, flow rate, nozzle spacing and discharge time have to be individually determined by carrying out application-related, full scale fire tests to provide optimum protection of the respective risk. Transfer or extrapolation of design criteria from one application to another, or basing the system designs on calculation models, is not possible. In past years, numerous full scale fire tests have been carried out at independent fire

logy Comes of Age

research institutes and laboratories that have lead to broad acceptance of watermist systems as alternative to conventional systems.

Hamburg Philharmonic Orchestra Hall

Special buildings and architecturally challenging environments require sophisticated tailor-made solutions to fulfil their fire safety needs. The integration of an automatic fire fighting system into the Elbphilharmonie Philharmonic Concert Hall in Hamburg, Germany was one such challenge. It is a typical example of where watermist technology has delivered an innovative fire protection solution that provides efficient cooling, low water consumption, minimal potential water damage, and straightforward installation due to small pipework and small water storage requirement.

A conventional sprinkler system could not be used due to the height of the area and the potential water damage that would result from system activation. Similarly, a gaseous fire suppression system could also not be used due to the evacuation time required by the audience. So, it was decided to develop an innovative fire protection concept, based on high-pressure watermist technology; a concept that was verified in full scale fire tests that determined the system design parameters.

Since the fire load in the concert hall is concentrated in the floor and seating area, the firefighting agent preferably needed be focused in this area. So, instead of attempting to contend with the concert hall height of 25 metres, it was decided that a floor integrated system would be most appropriate solution. Rapid activation of the system after fire detection would further increase the safety level, so the fire detection and the firefighting systems were jointly evaluated.

Full scale fire tests were carried out with fire loads and test scenarios derived from standards such as CEN TS 14972, and the fire test results were evaluated by independent fire consultants and a certification body – HHP and DEKRA – to confirm that the concept met all of the safety requirements.

A zoned deluge, high pressure watermist system was installed, triggered by a linear heat detection system integrated into the floor area. In standby condition, special nozzles are covered with lids and incorporated into the floor areas between the seats to meet the demanding requirements of the architects and acoustics engineers of the building. Three adjacent areas can be discharged simultaneously to cover the worst fire condition.

This protection concept for concert halls resulted in a safe and architecturally satisfying solution; one that was successfully integrated into the overall fire safety strategy of the building and approved by the regulatory authorities.

Eurotunnel protection

The Channel Tunnel Rail Link under the English Channel links Calais in France and Folkestone in England and is used by around 16 million passengers each year. Up to 450 train journeys are made through the tunnel every day, including the high-speed Eurostar passenger trains and the Eurotunnel car and truck shuttles. After truck fires in 1996 and 2008, Eurotunnel, the operating company, decided to reinforce the already high fire safety standards.

To achieve this, a special fire protection concept was developed based on the establishment of four separate firefighting sections within the tunnel, in which a fire on a train could be fought quickly and effectively. Due to the significantly larger potential fire load that trucks represent, these so called "safe" stations are primarily to protect truck shuttles.

The decision to incorporate a firefighting system inside the tunnel was based on the recommendation of an expert group that had carried out a quantitative risk assessment and a cost-benefit analysis. High pressure watermist was chosen due to its high cooling potential that helps to create a safe environment for passengers, staff and vehicles within the tunnel. The watermist system potentially contributes significantly towards reducing the intensity of a fire, and the heat absorption supports the successful evacuation of people, particularly during the first critical phase of a tunnel fire.

During a lengthy test program with the fire and rescue service, it was established that, even with heat release rates of more than 200 MW, the watermist system facilitates the fire brigade's rescue efforts and allows for effective control of the fire and rapid extinguishing.

The tunnels are fitted with four times 29 deluge fire fighting sections, each 30 metres long and independently controllable. Only open nozzles are used in order to provide full flow rates for every activated section, so maximising the effect of watermist from the beginning of the system's activation. IFP

Rüdiger Kopp is Sales and Product Manager at Fogtec Fire Protection

Wind Turbine Fire

Fire detection and suppression has become a top priority for turbine manufacturers and wind farm operators. Scott Starr reviews the options.

By Scott Starr

Firetrace International

With governments across the globe becoming ever more aware of the environmental benefits of wind-generated power, the number of wind farms and the financial investment in constructing, erecting and maintaining wind turbines is increasing exponentially. Today, the market is estimated to be worth $60 billion annually, with global wind capacity expected to double every three years. According to the WWEA (World Wind Energy Association) World Wind Energy Report 2009, the United States is the world leader in terms of the installed capacity of wind power, followed by China, Germany, Spain and India. Together, these five countries – again according to the WWEA – last year accounted for nearly 80 percent of worldwide wind capacity.

Such a high level of investment, coupled with the increased dependence on wind power, has led turbine manufacturers and operators to become acutely aware of the financial implications, safety issues and environmental impact of fire-damaged or destroyed turbines. Indeed, fire safety has become such an issue that the USA's NFPA (National Fire Protection Association), Germany's VdS (Vertrauen durch Sicherheit) and Germanischer Lloyd have developed recommendations, standards or codes of practice.

The NFPA has recently added wind turbine and outbuilding fire protection standards to NFPA 850 (Recommended Practice for Fire Protection for Electric Generating Plants and High Voltage Direct Current Converter Stations, 2010 Edition). This document provides fire protection recommendations for the safety of construction and operating personnel, physical integrity of plant components and the continuity of plant operations. The revised 2010 edition includes detailed recommendations relating to wind turbine generating facilities.

VdS 3523en (Wind turbines, Fire protection guideline) has also been used as the basis for the CFPA E (Confederation of Fire Protection Associations in Europe) Guideline No 21.2010 F, which addresses the same topic. VdS is a highly-regarded, independent, international, third-party accreditation and certification body for fire prevention and safety technology. Germanischer Lloyd, which specializes in classifications for the maritime and energy industries, has developed Renewables Certification Guidelines (GL Wind Technical Note Certification of Fire Protection Systems for Wind Turbines, Certification Procedures, Revision 2, Edition 2009).

Scale of the problem

A report by the AREPA Group, a technical service organization with operations throughout Europe that specializes in the assessment and restoration of damaged technical equipment, suggests that 184 wind turbine components were damaged by fire since 2002, while the Caithness Windfarm Information Forum believes that, as of September 2009, 122 wind farm fire incidents were reported globally. The cost of property damage on each of these reported incidents spans from $750,000 to $2 million.

However, many in the industry believe that these figures grossly underestimate the scale of the problem. A significant number of turbine fires go unreported, possibly because of a combination of their remote location and the fact that the emergency services are not always called upon to attend, and these fires do not form part of any official fire incident statistic.

Protection

Turbine fire risk

The almost inevitable consequence of these industry initiatives has been that a number of detection and suppression systems have been put forward as suitable solutions. While many are effective for what might be regarded as "conventional" applications, they may not be suitable for the particular fire challenges found in wind turbines.

The majority of turbine fires are started by a lightning strike, brought about by their exposed and often high-altitude location and the height of the structure; turbines are now being built that are up to 320 feet high. Mechanical failure or electrical malfunction also account for a significant percentage of fires that can be fuelled by up to 200 gallons of hydraulic fluid and lubricants in the nacelle, which itself is constructed from highly-flammable resin and glass fiber. Internal insulation in the nacelle, which can become contaminated by oil deposits, adds to the fuel load.

Electrical equipment is another high risk area. Capacitors, transformers, generators, electrical controls and transmission equipment, all have the potential to catch fire, as do SCADA (Supervisory Control and Data Acquisition) systems. There is also the risk of fire due to loose or broken electrical connections or the overloading of electrical circuits.

Braking systems pose a particularly high fire risk. Overheating can cause hot fragments of the disc brake material to break off, rupturing hydraulic hoses and resulting in highly combustible hydraulic fluid being expelled under pressure and coming into contact with the hot disk brake fragments. Hydraulic pumps and connections have also been known to fail, allowing the fluid to erupt into flames when it comes into contact with a hot surface.

Unique fire protection challenge

What are the special challenges that an effective fire detection and suppression system for a wind turbine have to overcome?

The core issue is, of course, remoteness. This is particularly the case with off-shore wind farms, but even on-shore farms are routinely in difficult to access or isolated locations. The essential characteristics of an effective wind turbine fire detection and suppression system are that it should:

- Deliver around-the-clock reliability and 24/7 unsupervised protection.
- Ensure an absence of false alarms.
- Contend with vibration, dust, debris and airflow through the nacelle.
- Contend with extreme temperature variations.
- Stop a fire precisely where it breaks out and before it takes hold.
- Require no external power.

The options that are often considered can be generally categorized as:

- Air sampling detection.
- Watermist suppression.
- Compressed-air foam suppression.
- Fusible link detection and suppression.
- Total flooding CO_2 (carbon dioxide) suppression.
- Total flooding clean agent suppression.
- Linear pneumatic detection and suppression.

Air sampling aims to offer early detection by collecting minute smoke particulates in the early stage of fire, but they do require a power source and control panel, which means that the system will fail if the external power or battery backup fails. These systems are also expensive, in part because they only detect a fire, and so need to be integrated with a suppression system.

The major drawback to air sampling in wind turbines though is the ever-present risk of false arms. These can be caused by tiny particles of dust and debris and atmospheric pollution that are propelled around the nacelle due to the turbine housing having a number of openings to allow air to circulate to reduce the internal temperature. While false alarms are the bane of any system owner's life, a false alarm in a wind turbine inevitably involves extensive travel and possibly the hiring of expensive specialist access equipment.

Suppression-only systems

Water mist suppression systems convert water into a fine atomized mist, but they too have limitations when used to protect wind turbines.

Due to the turbine's remote location and the distance from the ground to the nacelle, water mist systems are often impractical, plus they call for considerable space to be devoted to water storage, which increases the weight in the nacelle. These systems are also a costly part-solution to the problem, as they need to be linked to a detection system.

Water mist systems are total flooding solutions, which increase the potential for damage to electrical components and possible corrosion. Also, because in some locations the temperature can fall below freezing point, antifreeze has to be added

to the water, and antifreeze is a combustible liquid that is itself a corrosive substance.

Compressed air foam systems work on the principle that compressed air is injected into a foam solution to achieve a quicker fire knockdown when compared with conventional foam systems. While they need less water than conventional systems, the storage, weight and freeze-protection problems are similar to those of water mist systems. In addition, these systems require considerable extra space for the operating components. After discharge, clean-up can be extensive and, like water mist systems, the cost is increased by the need for a separate detection system.

Fusible link systems do however combine detection and suppression into one package and work on the basis that heat from a fire will rupture a fusible link – the detection element – that in turn will initiate the discharge of the suppressant. The challenge with these systems is that airflow in the nacelle can seriously impair performance and reliability because heat and flame that typically rise from the source of a fire may be propelled away from the location of the fusible link, critically delaying activation.

Total flooding gaseous systems

Whether using CO_2 or the latest clean gaseous agents, traditional total flooding suppression systems are designed to fill the entire space being protected with suppressant.

CO_2, while an established suppression agent, is not without its drawbacks. It is unsuitable for total flooding applications in potentially occupied enclosures, as its discharge in fire extinguishing concentrations would be lethal to occupants. Flooded areas must be adequately ventilated after discharge to prevent accidental exposure of personnel to dangerous levels of CO_2 when investigating the cause of a discharge.

However, these challenges do not exist with clean agents, such as 3M™ Novec™ 1230 Fire Protection Fluid. The suppressant is stored as a low-vapor-pressure fluid that, when discharged, vaporizes into a colorless and odorless gas. Typical total flooding applications use a concentration of the fluid that is well below the agent's saturation or condensation level and its low design concentration means that less space has to be devoted to cylinder storage. Novec 1230 has a negligible impact on the environment, with insignificant global warming potential, zero ozone depletion and an atmospheric lifetime of just five days. Once discharged, it leaves nothing behind to damage sensitive electronic equipment.

Traditional total flooding systems are not without any downsides. Vibration can loosen connections, while dirt, dust and temperature extremes are known to cause unwarranted discharge. Additionally, openings in the turbine housing significantly inhibit achieving the designated agent concentration. Devising a solution to overcome these challenges can add significantly to the weight in the turbine.

Integrated detection and suppression

The major drawbacks of traditional total flooding suppression systems, and the shortcomings of other technologies put forward for the protection of wind turbines, are overcome in the FIRETRACE® linear pneumatic system that provides both fire detection and suppression in a single package.

It is a self-contained system that, significantly, requires neither electricity nor external power; a solution that is activated automatically around-the-clock without the need for manual activation or monitoring, and requires virtually no maintenance. It is an intrinsically safe solution, as it does not contain any components that produce sparks or which can hold enough energy to produce a spark of sufficient energy to cause an ignition.

FIRETRACE comprises a cylinder that, for wind turbine applications contains 3M Novec 1230, that is attached to a purpose-designed proprietary Firetrace Detection Tubing via a custom-engineered valve. This leak-resistant polymer tubing is a linear pneumatic heat and flame detector that is designed to deliver the desired temperature-sensitive detection and delivery characteristics. It is routed throughout the areas to be protected and, when the tubing is exposed to heat and radiant energy from a fire, it ruptures and instantly directs the suppression agent at the source of the fire.

A key factor in its success – there are over 150,000 FIRETRACE systems installed around the world – is the system's reliability. The fact is that the only thing that will rupture the tube is heat or flame from a fire, so there is no prospect of false alarms; yet, if a fire breaks out, the response is unerringly immediate and accurately targeted. It is the only UL (Underwriters Laboratories) listed, FM (Factory Mutual) approved and CE (Conformité Européene or European Conformity) marked tube-operated system in the world that is tested as an automatic fire detection and suppression system. IFP

Scott Starr is Director of Global Marketing at Firetrace International
www.firetrace.com

Chicago Art Institute Building. Renzo Pianos Modern Wing

Intelligent Fire Safety Design

Fire safety professionals have to admit that fire safety is too often relegated down the list of priorities. Others, sadly, do not share their passion. Fire safety tends to be seen pragmatically as a minimum measure, an imposition driven by regulations to be side-stepped if at all possible. There are lessons from the world of glass: work with the flow of design and not against it, as Mike Wood explains

By Mike Wood

Pilkington UK Limited

Integrated design

Architects have had a dream for a light-filled, crystal palace of glass architecture ever since the mid 19th century, articulated by the visionary Paul Scheerbart in Glasarchitektur in 1914. This was taken several steps onwards by Walter Gropius and the foresight of the Bauhaus school in the 1920s and 1930s, and later explored by Mies van der Rohe in the towering skyscrapers of US cities from the 1950s onwards.

The central thread of the architectural story through the 20th century into the 21st is an international one that is fundamentally founded on an increasing use of glass in ever more creative building styles. This is linked to increasingly innovative and complex highly-engineered and calculated structures. Today's skyscrapers carry the legacy of London's original Crystal Palace of 1850 – which was destroyed by fire in 1936 – based on design and construction ideas a century ahead of their time.

It is the use of glass in buildings that has provided the continuity and drive for architectural development, to satisfy both basic psychological human needs and lofty ambitions. Natural daylighting, comfort, security, privacy, sustainability and energy efficiency rate highly. Image, decoration and presentation also receive a particular emphasis in this modern marketing-led consumer world. As a result there is a high technology sophistication to modern buildings. Fire-resistant glass has followed. And fire-resistant glazed systems, like all fire-resistant systems, have had to develop accordingly to match the sophistication of modern buildings.

The earliest development was wired glass, introduced in the 1890s for the first large span glass roofs of the central city rail transport hubs of the time – still one of the most effective, reliable and robust types of fire-resistant glass; the sterling workhorse of the fire-resistant range of glazing solutions. The current range of clear fire-resistant glass types have only developed, in the main, over the last 30 years. They are still relatively new, and based on a diversity of glass technologies each with its own strengths; some with weaknesses that could be potentially critical in some fire circumstances. They are still undergoing development in order to keep pace with the fast rate of architectural change.

The case is that fire safety has to catch up with design and building practice. Fire safety is not a leader. And therefore fire safety has to integrate with the full architectural context, as part of the functional mix. Fire safety cannot sit outside the design process and be seen simply as an add-on after all the other building needs have been addressed. The risk, however, is that this is where fire safety, in effect, chooses to make its stand.

Range of application

The range of application for some fire-resistant glass types is now so extensive that it is no exaggeration to say that virtually all potential major

applications where glass could be required in buildings are possible in fire-resistant glass. Other fire-resistant glass types are more limited and restricted in use. Each one needs to be taken on its own merits; evaluated in its own right. Assumption that one fire-resistant glass is exactly like another can be risky – potentially dangerous.

Internal applications cover door vision panels, full glass door sets and surrounding screens, large-area glazed partitions, some including integral blind systems, overhead panels and even sliding door systems. Advanced load-bearing fire-resistant glass floors are also possible. Pilkington has taken the lead in this development, being successful with not only steel framing but also timber framing for particular aesthetic effects. For older heritage buildings sensitive refurbishment may be needed to bring them closer to modern standards. Secondary fire-resistant glazing systems have been developed to preserve the character of the original casement without damage to the exterior while providing the required fire protection on the inside.

External applications include not only the façade but also multi-layered overhead glazings for horizontal or inclined roof applications to allow the maximum light presentation into corridors and working or living areas, also fulfilling safety requirements necessary for overhead glazing. One of the relatively neglected aspects of fire movement in buildings – that of break-out followed by break-in through the external glazing of upper floors – is receiving increasing attention in view of the analysis of fire disasters in glass towers. The fashion for atria in designs has also led to some interesting fire-resistant solutions, including smoke control and prevention of break-out and break-in of fire from adjacent room glazing looking out on to the atrium.

The designer has many available options in glass. And the adaptation of fire-resistant glass to fit the overall glass and natural lighting concept is a key development in allowing designers and specifiers to meet their overall design objectives.

Function

Glass, of course, is used primarily for its transparency. That imposes limits on fire-resistant glass types that have only a basic integrity function, lacking significant performance as a fire insulation heat barrier. The dangers of heat in a fire are high, so basic integrity function limits such glass types to relatively smaller sizes and limited runs of glazed panels. Such types may also only really be suitable for the immediate needs of fast escape, within 15 minutes or at most 30 minutes from the time occupants start to move to a place of relative safety.

Fire-resistant glass types, which have a full insulation capability and integrity, provide a much wider scope of application and they are capable of countering a much wider range and type of fire risk. Insulation performance provides less uncertainty for those who rely on fire protection and have a much greater capability of providing safe working conditions for firefighters.

Products with good insulation performance are therefore especially appropriate when escape could be more hazardous, the building more complex and the conditions less certain. That would apply, for example, to health and education establishments, transport centres – particularly airports – multi-functional buildings where the occupants are not accustomed to the building, sleeping accommodation, and major buildings, for example museums, art galleries, modern offices and industrial plant containing high value assets. Fires may well last for up to 24 hours and the exposure of an element of construction could be several consecutive hours within that period. Fires in modern buildings, based on fixtures, fittings and furnishings with a high plastic and synthetic content, can be particularly intense and fast moving. Insulation performance provides the additional assurance to minimise risks.

Flexibility in design

One of the main requirements for designers is flexibility and freedom to develop core design concepts; in particular, an ability to make adjustment to meet the demands of the client's specification and budget, without compromising on the basic requirements for safety, security, comfort and efficiency. Implicitly, fire safety has to be a balance, in tune with design.

One of the prime objectives of fire-resistant glass, in addition to providing safe escape, is to allow effective fire compartmentation without sacrificing openness, vision and innovation in layout and building arrangement. The first requirement for fire-resistant glass is to fit the design requirements. The second objective is to satisfy the demands of fire protection for the building and its occupants, restricting fire to its place of origin, preventing spread and avoiding collapse. Fire compartmentation is a basic requirement for fire safety in buildings, as it provides a basic foundation for all other fire-safety measures.

Clear fire-resistant glass cannot readily be distinguished from other glass products surrounding it. That has been a key objective for the development glass technologist, as fire-resistant glass has to look and function the same in all other respects, with the addition of resistance against fire. That is why it is particularly important to specifically identify fire-resistant glass with a permanent, easily readable mark, normally positioned in a bottom corner, at least noting the product name, manufacturer, fire performance class and, where relevant, impact classification. Too often, the mark is illegible or non-permanent. If there is no mark, the assumption must be that the glass is not a fire-resistant glass.

Fire-resistant glass can now be combined with a whole range of other functions demanded of glass, such as impact safety, energy efficiency, security, privacy, and solar control, while providing the highest performance of all – fire resistance. One of the particularly useful additional benefits of the

Comparison of acoustic sound insulation data

Products not classified for fire resistance	Sound attenuation index R_w (C;C_{tr}), reference EN ISO 717-1, in dB
Pilkington Optilam (6.4mm standard laminate)	32 (–1; –3)
Pilkington Optiphon (6.8mm acoustic laminate)	35 (–1; –3)
Pilkington Optiphon 6.8mm in dgu, 16mm gap	38 (–2; –6)
Pilkington Optiphon 9mm in dgu, 16mm gap	39 (–2; –6)
Products classified for fire resistance Integrity fire resistance	**Sound attenuation index** R_w (C;C_{tr}) index, reference EN ISO 717-1, in dB
Pilkington Pyrodur Plus (7mm, E/EW 30, EI 15)	35 (–1; –3)
Pilkington Pyrodur (10mm, E/EW 30, EI 15)	36 (–1; –2)
Pilkington Pyrodur 10mm in dgu, 12mm air gap	38 (–2; –5)
Pilkington Pyrodur (13mm, E/EW 60, EI 15)	38 (–1; –2)
Products classified for fire resistance Insulation with integrity fire resistance	**Sound attenuation index** R_w (C;C_{tr}), reference EN ISO 717–1, in dB
Pilkington Pyrostop (15mm, EI 30)	38 (–1; –2)
Pilkington Pyrostop (18mm, EI 30)	38 (0; –2)
Pilkington Pyrostop 18mm in dgu, 12mm air gap	40 (–1; –5)
Pilkington Pyrostop (23mm, EI 60)	40 (–1; –3)
Pilkington Pyrostop 18mm in dgu with Pilkington Optiphon™ (9mm), air gap 12mm	45 (–1; –5)

proprietary intumescent laminated fire-resistant technology utilised for Pilkington Pyrostop and Pilkington Pyrodur, for example, is enhanced acoustic insulation performance, which is a requirement of increasing importance in modern high-density occupancies. The special glassy fire-resistant interlayer and the composite-layered structure of these laminated products together deliver good sound insulation; a valued benefit when combined with fire-resistance in one product.

Her Majesty's question

On a visit to the London School of Economics in November 2009, HM Queen Elizabeth II is reported to have asked the assembled accomplished economic experts why no-one had foreseen the financial credit crisis and provided a warning.

It is a valid question and one that Her Majesty might equally ask, given the opportunity, of fire safety specialists in the context of fire. Why do we still have major property losses in fire that in the UK amount to £1.3 billion a year, and are rising? And why do we still have tragedies when lives of residents and firefighters are unnecessarily lost? We know how to build and operate buildings with enhanced levels of fire safety; the difficulties lie rather in application and operation according to principles of good or best practice, which are well demonstrated. Enforcement is also part of the problem; compliance with clear standard and regulatory guidelines. Another major factor is a disturbing tendency to ignore requirements and apply them down to the lowest possible level, too often in the face of knowledge, with too close an eye on cost cutting.

Her Majesty might equally have followed her first question with a supplementary for the gurus on whether risk-taking practices had perhaps crossed over the boundary from prudence to recklessness, and if it could possibly be that practitioners had been so wrapped up in what they were doing that they did not notice that limits had been transgressed. That question is also one that fire safety needs to ask, as fire safety design and engineering is increasingly cast adrift from the anchor of prescriptive guidance in a move towards risk-based techniques, dependent more and more on unchallenged expert judgment. There should be circumspection that risk-based techniques do not become adventures in the land of probability and chance.

Performance

Modern buildings and assets are high value, while cities and buildings more congested. The risk to people in some senses is higher than it was because of developments in the built environment. Fitness for purpose of designs and, in turn, of building elements, products and components is essential if the overall objective is fire safety. Because of the unpredictability and intensity of fire, attention to quality of performance has to become an obsession. That, in turn, requires recognition and acceptance of personal responsibility, applying to all those along the chain from the design to installation, including product supply, building operation and ownership. That above all is the critical imperative needed for advances in fire safety. IFP

Notes:

1. Sound insulation data measured in accordance with BS EN ISO 140-3.
2. Correction factors C and Ctr take into account the different frequency spectra of residential and traffic noises, respectively.
3. "dgu" refers to a double glazed unit with a 6mm float glass pane unless otherwise indicated.
4. Fire resistance classifications in accordance with BS EN 13501-2
   E = integrity; EW = integrity and radiant heat; EI = fire insulation performance; 0, 60 etc = classification test time in minutes.
5. The Pilkington Pyrodur and Pilkington Pyrostop range are also classified for impact safety according to BS EN 12600.
6. It is advisable only to directly compare acoustic indices measured and recorded on the same basis. Estimates may be used in place of measurement and each determination has a natural measurement variation.

Mike Wood is Head of Fire Protection (Glass & Glazing) at Pilkington UK Limited
www.pilkington.co.uk/fireresistant


The toughest fire resistant glass is now also produced in the

Fire Alarm System Design

Key Changes to NFPA 72: 2010 Edition

By Ed Orazine

Consultant for Rolf Jensen & Associates

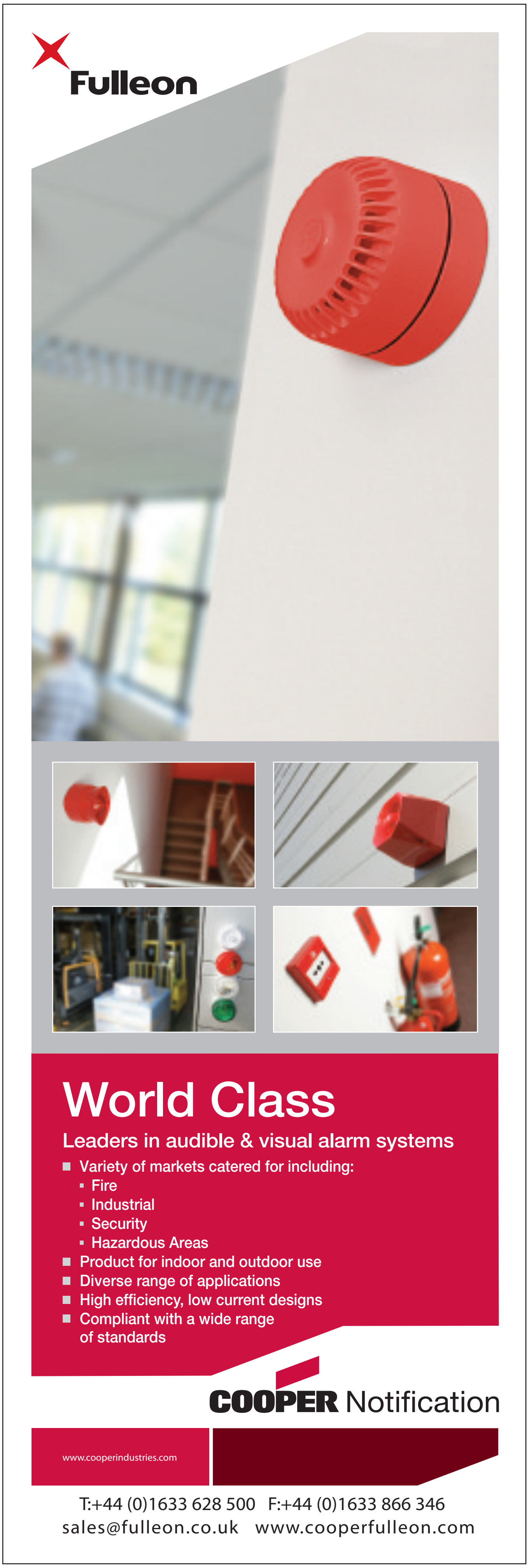
The codes and standards for fire alarm systems provide the minimum installation requirements, and do not necessarily reflect all the concerns. Ed Orazine explains.

Industry buzzwords such as survivability, intelligibility, and mass notification are becoming of greater importance in the design of fire alarm systems. In recent years, commercially available fire alarm systems have undergone changes in technological design and functionality in both fire and non-fire modes of operation. Newer, more complex fire alarm system head end components are virtually small computer networks that perform a variety of functions and controls. In 2009, Underwriter's Laboratories issued an updated version of UL 864 (Standard for Safety Control Units and Accessories for Fire Alarm Systems) to increase the minimum acceptable performance for response time, voice messaging capabilities, software performance and other criteria.

As a distinction, the design and installation of fire alarm systems is dictated by model codes and standards that can be adopted and amended by a jurisdiction. A commonly referenced standard, NFPA 72 (National Fire Alarm Code) has itself undergone a major revision with guidelines on the installation of fire alarm systems to improve performance and increase reliability of control functions, such as occupant notification. Three of the most scrutinised fire alarm system design considerations in recent years are survivability, audibility/intelligibility and mass notification.

Codes and standards

Most building and fire codes adopt NFPA 72 as a reference standard for fire alarm design and installation. The standard is applicable in almost all federal, state and local jurisdictions throughout the United States, and now in many countries around the world. The National Fire Protection Association has recently released its 2010 Edition of NFPA 72, and is already being considered for



adoption in many jurisdictions due to much enhanced/additional code language such as new guidelines on mass notification (or Emergency Communication Systems as referred to in NFPA 72). However, there are also other significant changes, of which designers and code officials should be aware, as adoption of the 2010 Edition of NFPA 72 progresses. As indicated above, key code language revisions have been incorporated in the areas of survivability, intelligibility, and mass notification systems.

Survivability

A standard smoke detector may have a listed temperature range of 32 to 120 degrees F, while a standard heat detector may be rated for 135 degrees F and only listed for temperatures up to 155 degrees F. The rationale is that the smoke or fire will be detected before the device fails due to exposure to high ambient temperatures.

The same considerations must be given to the fire alarm control equipment, signalling and notification circuits which will fail at elevated temperatures from fire exposure. With larger buildings and more complicated partial evacuation schemes, it is critical that the survivability of the system is maintained to transmit vitally important messages to occupants during an emergency condition. The fire alarm system is also responsible for monitoring the status of the building and initiating a variety of other control functions. These functions include control of fans, operation of doors, operation of lights and background sounds, smoke control, activation of fire suppression systems, monitoring automatic sprinklers, generators, fire pumps and elevator controls. One of the most important functions however, remains the alerting of occupants to a fire or other emergency.

Most building and fire codes adopt NFPA 72 as a reference standard for fire alarm design and installation. The standard is applicable in almost all federal, state and local jurisdictions throughout the United States, and now in many countries around the world.

Evacuation in a high-rise is typically achieved by directing the occupants on the floor of the fire and the two adjacent floors to evacuate, while alerting the occupants on other floors without directing their evacuation. In larger building floor plates, evacuation may be achieved horizontally from one zone to another. In mixed use occupancies the evacuation zoning may be based on the occupancy. A mixed use building with theatre, retail, and residential uses may be configured such that an alarm in the residences due to smoke from a cooking appliance does not immediately initiate evacuation of the theatre. In each of these cases, the control functions for the operation of the

emergency equipment may be zoned separately. There may be floor exhaust or pressurisation systems, automatic door closers, fire shutters, or other systems that are required to protect the occupants and allow for evacuation.

Therefore the fire alarm system in accordance with NFPA 72 is to be designed to be operational in emergency conditions. In the 2007 Edition of NFPA 72, 6.9.4 states that: "fire alarm systems in partial evacuation buildings must be designed and installed such that a fire in one evacuation zone (fire floor) does not impair control and operation of other evacuation zones (e.g. other floors). This can be accommodated by two-hour rated fire cable, two-hour rated enclosures (stacked rooms) or performance alternatives acceptable to local Authority Having Jurisdiction." In a partial building evacuation scheme, the emergency voice system must be fully functional for the duration of the fire event so that occupants remaining in the building can receive follow-up voice messages. If the fire is not controlled, total building evacuation may eventually become necessary.

The 2010 Edition of NFPA 72 now defines four levels of signalling and notification circuit survivability. Pathway Survivability Level 2 (two-hour fire rated cable or construction) and Level 3 (sprinkler protection plus two-hour fire rated cable or construction) should be provided for fire alarm systems that are configured to initiate partial evacuation, or relocation of occupants.

The 2007 edition of NFPA 72 specifically recognised sprinkler protection (with circuits in metal conduit) as an option for achieving survivability in lieu of a two-hour fire resistance rating. The 2010 edition no longer specifically recognises this option such that it would need to be approved as a performance alternative by the authority having jurisdiction.

Audibility vs Intelligibility

For many applications of fire alarm systems, the method of occupant notification is a general evacuation signal using a temporal tone or other approved pattern. The tone pattern is useful for the complete evacuation of a building; however, as noted with survivability, the fire alarm system is a backbone for the building emergency system, and provides a means for one-way communication to occupants in the event of an emergency. A voice evacuation system provides a flexible means of providing a general evacuation tone, messages for partial evacuation, or for providing instructions in case of an emergency. The voice messages may be pre-recorded or live.

The output of the system to notify occupants can vary, and the information on a voice evacuation system may vary as well. A person pulling a manual fire alarm box may be doing so not for a fire, but because they have a medical emergency. With the incorporation of mass notification code language in NFPA 72, the emergency voice system is becoming an even more important part of the building infrastructure. Therefore, the voice evacuation system needs to be designed to provide an intelligible (understandable) message either live or pre-recorded.

NFPA 72 18.4.10 states for intelligibility, "Within the acoustically distinguishable spaces (ADS) where voice intelligibility is required, voice communications systems shall reproduce pre-recorded, synthesised, or live (e.g., microphone, telephone handset, and radio) messages with voice intelligibility." The ADS (per NFPA 72) is an emergency communications system notification zone, or subdivision thereof, that might be an enclosed or otherwise physically defined space, or that might be distinguished from other spaces because of different acoustical, environmental, or use characteristics, such as reverberation time and sound pressure level. The ADS should not be confused with an occupant notification zone which should be separated from other such zones by fire or smoke barriers.

Developing a voice evacuation system that meets intelligibility in accordance with the codes and standards is becoming a more recognised part of the fire alarm design process. The fire alarm designer needs to be aware of the sound characteristics of the space when considering location of speakers. The new ADS requirements are intended

to provide various options to address intelligibility, but provide alternative notification such as strobes or signage, and voice messages should be intelligible within a reasonable distance of the area in which intelligibility cannot be achieved. The design drawings, per the new NFPA 72 requirements, should show the areas of intelligibility, and define how occupants are to be notified in case of an emergency announcement.

As part of the design process, the designer will need to develop a plan for testing and confirming that the system works as designed. Different pre-recorded messages may influence the intelligibility of the system as much as speaker placement. There are several test methods listed in NFPA 72 that include both qualitative and subjective approaches. Additional coordination with the local authority may be required as more familiarity with the concept of intelligibility is developed within the fire protection community. A registered fire protection engineer should be consulted if the designer is unfamiliar with these concepts.

Mass notification

A significant revision to NFPA 72 is to include emergency communication systems, also referred to as mass notification. An emergency communication system may be provided voluntarily, or mandated from a building code, agency, or ordinance. Whether mandated or voluntary, the emergency communication system should be provided in compliance with Chapter 24 and Chapter 27 of NFPA 72. Part of the NFPA 72 design process includes an emergency plan and a risk assessment. It is important for the designer(s) to develop a system that meets the needs of the end users, which may include local authorities such as police and fire, as well as building security.

A mass communication system will not have the same performance requirements as a standard voice evacuation system due to the way the system may be used. The emergency communication system may include speakers on the exterior of the building, or utilise a wide array to alert multiple buildings. Additionally, technical requirements are provided for both one-way and two way communication. The available power supply and secondary supply to the panels may need to be increased beyond a customary 24 hour standby and 15 minutes of alarm to allow for communication for an extended duration. Also, the designer needs to look at system interfaces, who is being notified, signal priorities, and what messages are sent based on relocation of occupants or when alerting multiple buildings.

Summary

The codes and standards for fire alarm systems provide the minimum installation requirements, and do not necessarily reflect all the concerns. Additionally, more restrictive guidelines for circuit protection and intelligibility aim to improve the reliability of the system during an emergency. The new 2010 Edition of NFPA 72 includes requirements on Emergency Communication Systems, as the growing use of mass notification continues, to provide minimum installation standards. The emergency communication system may require additional measures that need to be developed through a risk analysis. A professional engineer is required for proper application of the codes and for engineering a system that meets the needs of the occupants and owner. IFP

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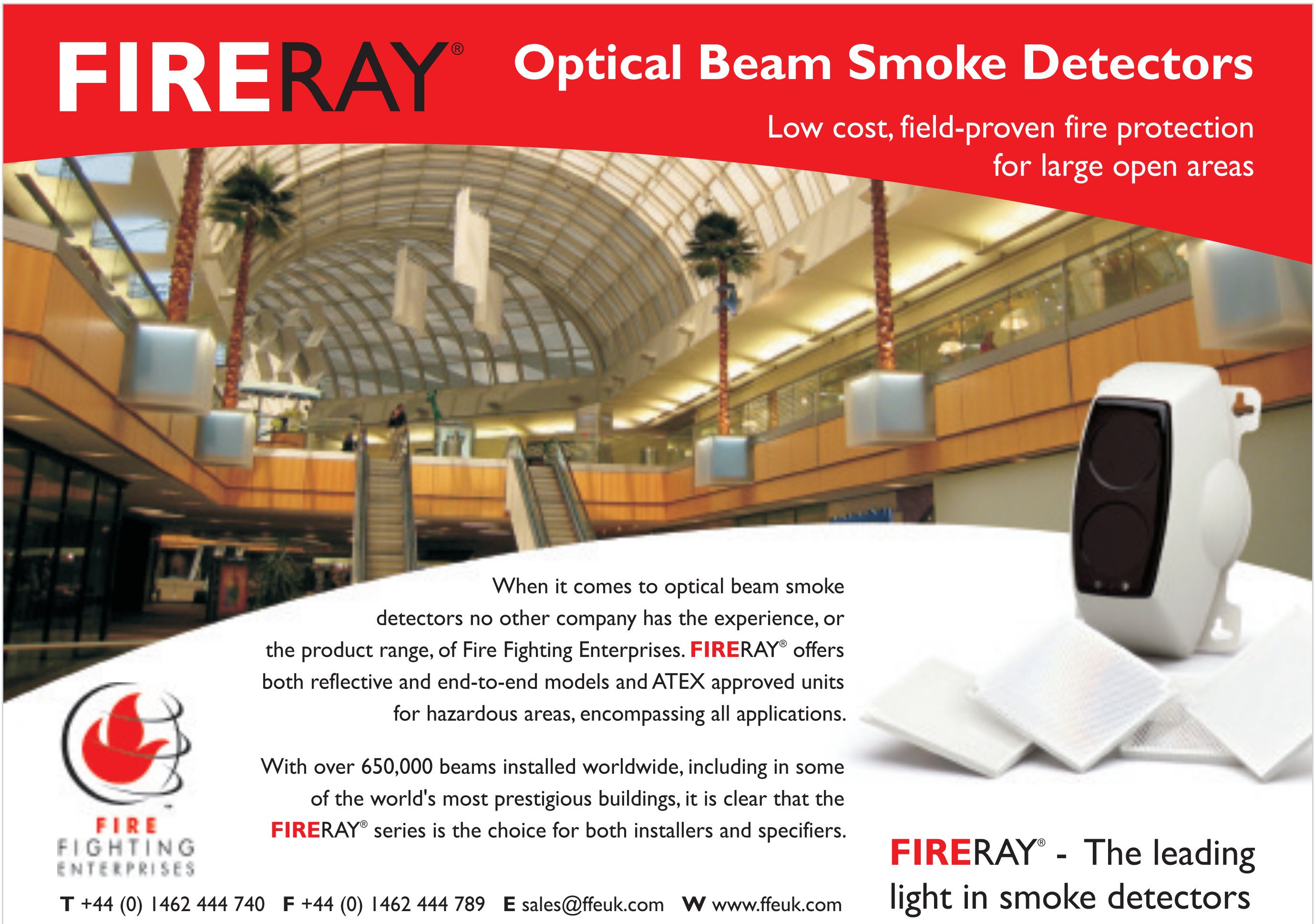
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For Whom the

By Stuart Ball

System Sensor Europe

False alarms are a major concern both to the automatic fire detection industry and the fire and rescue services. Stuart Ball explains.

In a typical year, more than 50 percent of all false alarms are attributable to automatic fire systems, at an estimated cost of more than £1 billion in the UK. The problem is being addressed on several fronts. Control panel and detector manufacturers have invested heavily in hardware and software developments to reduce the incidence of unwanted alarms, and the fire services have started to implement alarm management procedures in sites where there is an established pattern of repeated false alarms. So serious is the problem that some fire and rescue services have implemented a policy, applicable to selected premises with a particularly poor history of false alarms, which requires human confirmation of a fire before they will attend an automatically generated alarm.

Clearly, the onus is on the automatic detection industry to improve its performance. Obviously, the greatest potential for improvement lies in the fire detector: if it does not generate a false alarm in the first place, the control panel will not activate the sounders, shut down the air conditioning plant, open smoke vents, close the fire doors and call the fire service. Enabled by the increased power of modern electronics, in recent times alarm management at the panel level has become increasingly complex, with pre-alarm levels, group polling, day/night sensitivity level adjustment, phased evacuation and other initiatives that render the fire system more responsive to real fire and more robust in its rejection of false alarms. However, the great majority of the improvements in the

Bell Tolls

panel rely upon increasing complex signal processing in the detector, allowing multiple alarm levels to be generated, and more sophisticated communication protocols between the detector and the panel that provide enhanced communications between the two main components of the system.

Series 200 Advanced detector family

Dectector types and advances

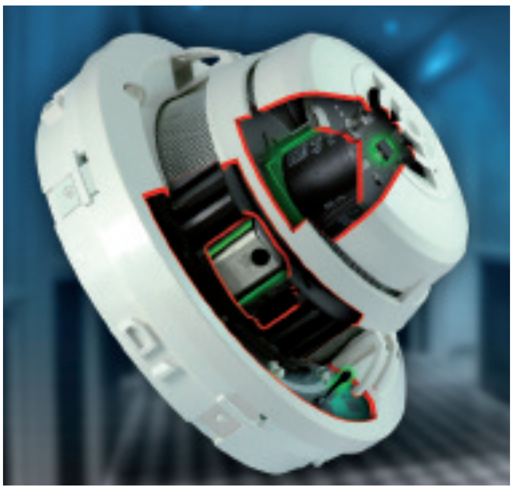
Given the importance of the detector in reducing false alarms, it is important not to lose site of the primary objective of responding to a fire at the earliest possible stage in its development – namely to enable timely evacuation of the occupants and to minimise the damage to the building's structure. Over the years, detectors have evolved in functionality from simple "yes/no" switches to multi-sensor intelligent devices with powerful embedded signal processing.

Increased capability of the detectors has been achieved primarily through the use of multi-sensor technology, in which different sensors, characterised to different products of combustion, enable the main sensor – the optical smoke detector – to be set to a higher level of sensitivity than would normally be the case. In simple terms, if the smoke detector detects particulate matter in the sensing chamber, an alarm state is not signalled to the panel until other sensors have been interrogated and have confirmed the alarm as genuine. As a very basic example, in a photo-thermal detector, dust in the optical chamber may set the optical detector into alarm, but without any heat rise reported by the thermal elements, the alarm condition will be rejected and not communicated to the panel.

The first detector was the ionisation smoke detector that was developed in 1941, and was the foundation of today's multi-billion pound global fire detection industry. Without doubt, the ion detector is an extremely effective device for the rapid detection of fast developing flaming fires, and, if it were not for the environmental pressure and increasing legislation surrounding the use of radioactive material in smoke detectors, it would continue to occupy an important place in the product portfolio.

The reality is, of course, that no manufacturer has developed a new ion detector for many years; they now represent a small and falling percentage of the product mix and, in several countries, they are banned outright. Legislation and environmental considerations are weighted heavily in favour of optical technology; in most countries, it is becoming harder to obtain approval for an ionisation detector, and the regulations surrounding the transportation of radioactive materials are becoming more stringent and consequently more expensive. With increasing emphasis on environmental protection, it is sensible that the use of products incorporating radioactive sources should be discouraged where a true alternative exists.

The optical detector, developed to improve response to slow-developing fires, is today's most widely used technology, but it is relatively weak at responding rapidly to fuel fires. The photo-thermal detector was developed to address the inevitable balancing act between increasing the sensitivity of a detector, so that it responds more quickly to an incipient fire and the consequent increase in the false alarm rate. Originally crude units, in which two independent sensors – an optical and a thermal detector – were mounted in a single housing, the increased availability of low cost embedded microprocessors has enabled true composite units to be developed. Signal processing in the detector head itself resulted in the panel being presented with a single composite result from the raw data generated by the two sensors, improving the effectiveness of the device across the fire spectrum.



Carbon Monoxide, Photo Thermal, Infra Red COPTIR multi-sensor detector

Fully digital communications protocol between the panel and the detector

these tests, while other single and multi-criteria detector technologies alarmed. The false alarm tests were chosen to reflect the typical false alarm scenarios that a photoelectric detector would face in the field. The fire alarm tests included:

In a small room:

- Waste basket smouldering to flaming.
- Waste basket flaming.
- Heptane flaming.
- Wood smouldering.
- Cardboard smouldering.
- Waste basket flaming under a desk.
- Smouldering carpet.
- Waste basket flaming.
- Flaming shredded paper.
- Heptane flaming.
- Vegetable oil in rag flaming
- Wires on a hot plate.

In a standard fire room:

- EN54 heptane reduced amount.
- EN54 heptane reduced amount with bright halogen lights on (IR test).
- EN54 cotton reduced amount.
- EN54 smouldering wood reduced amount.
- UL268 smouldering wood fire.
- UL268 flaming wood fire.
- UL268 paper.
- UL268 heptane.

The fire tests selected were biased to the flaming end of the scale, because it is known that these are less favourable to the photoelectric smoke detection technology. The test results showed conclusively that although the detector is highly insensitive to false fire alarms, this does not compromise its potential for fire detection; it also conclusively demonstrates that it provides the best performance available for detection of fires across the full spectrum of different fire types.

Improved effectiveness in the detection of fires and the rejection of spurious sources has been supported by parallel advances in the communications protocols between the detectors and the control panel. The latest digital protocol enables greater customisation and the implementation of advanced features in the fire system. Installation costs and total cost of ownership are reduced by allowing more devices on each analogue loop and giving greater control over maintenance intervals.

Group polling improves system performance considerably. There is no limit to the number of devices that can be grouped together on the same loop, and by implementing group polling, the response time for an alarm to be detected is reduced to less than 2.5 seconds. Output devices, such as sounders and strobes, will be fully controllable from the panel, enabling tone selection and output levels to be set from the panel according to the status of the alarm; all warning devices on each loop will automatically be synchronised.

In combined sounder-strobe units with a single loop address, individual control of each element is achieved through the use of sub-addresses, enabling, say, a pre-alarm warning to be indicated by the use of the strobe only, so that staff can investigate the situation. IFP

Multi-sensor detection

The multi-sensor detector concept has now been extended with the addition of more sensors, each one aimed at detecting a specific product of combustion. It is well known that every fire has a different profile during its development; however different the characteristics of the inflammable material, all fires have three characteristics in common: they all produce carbon monoxide, heat, and particulate matter.

The proportions change from one fire type to another, as does the time during which each element is produced, but in every case, to a greater or lesser extent, each of these three elements will be present. In cases where the fire is burning fiercely, it will additionally produce a changing light signature as the result of the flame generation. Several manufacturers have introduced tri-sensor devices, in which the smoke and heat detectors are augmented by the addition of an infra-red sensor. Again, embedded intelligence in the head manages the inputs from the three sensors.

Extending this principle even further, the latest multi-sensor detector to be launched is a quad sensor device, which combines optical, thermal, carbon monoxide and infra-red detectors into a single device. For example, the System Sensor quad-sensor device, COPTIR, has been subjected to an extremely rigorous series of 21 different false alarm tests and 29 different fire alarm tests, and in all of them, it has outperformed any alternative technology from any manufacturer.

The false alarm tests included:

- Water mist.
- Condensation plunge.
- Ramping aerosol in smoke box.
- Spray aerosol – small room.
- Propane buffing of floor – small room.
- Dust and fan small room.
- Disco fog – small room.
- Toast – dried white bread.
- Deep fat frying potato chips.
- Water mist with fan on inside container.
- Oily toast in toaster oven.
- Oil coated pan – toaster oven.

COPTIR did not return a false alarm in any of

Stuart Ball is Marketing Manager at System Sensor Europe
www.systemsensoreurope.com

Protecting the

Karlstejn Castle

Historic buildings come in all shapes and sizes; they can be stone, brick or timber-built; surrounded by near-impenetrable jungle or alongside a vehicle-clogged highway; some are so old they almost defy dating. But they have one thing in common . . . they are irreplaceable. IFP editor, Graham Collins argues the case for better fire protection.

By Graham Collins

The scale of the problem of protecting historic buildings spread across the globe is daunting. In England alone there are 400,000 Grade I and Grade II listed heritage buildings; worldwide, the tally must run into tens of thousands, and a very significant proportion are considered to be "at risk" in one form or another. Some are threatened by a chronic lack of care, others by the tramping feet of too many visitors; vandalism, war, terrorism, climatic change and simply the passage of the centuries have also added to the toll.

In many cases, man's ingenuity, commitment and sheer hard work has brought historic buildings back from the brink of oblivion. Sadly though, fire is a threat from which it is often – particularly with highly-combustible buildings – impossible to recreate anything more than a sterile replica of the original. Of course, the technology does exist to safeguard these structures from the ravages of fire; the same cannot however be said for every nation's willingness or ability to devote the necessary funds to the task. In too many countries around the world, fire protection comes down to little more than sheer optimism that a fire will not occur and the watchful eyes of those working in or living near the building.

While the range of historic buildings is diverse, construction methods also vary greatly. By definition, the vast majority were constructed before any fire safety codes or standards were even considered; they frequently feature a labyrinth of dead-end corridors and concealed chambers, and escape routes were never part of the original designer's thinking. Compartmentation is often non-existent.

With the exception of some religious buildings, none were designed for the purpose for which they are now used. Castles, for example, were designed to keep enemies out; they were never built to accommodate thousands of transient visitors. Take, for example the Kinkaku-ji temple or Golden Pavilion in Kyoto. Today it is one of the most visited buildings in Japan, but was built for the exclusive use of the ruling shogun in the 14th

Past

century. Ironically, perhaps, it is one of the "fac-simile" historic buildings, as the original was burnt to the ground in 1950. Even those buildings, such as temples, that were designed to be accessible to the public, were not conceived to contend with the hoards that today regularly stroll though.

The scope for passive fire protection is obviously very limited, as the introduction of conventional fire doors and partitions can have a disastrous affect on a building's character and historic interest. The task of protecting the structure itself, its contents, staff and visitors is, therefore, best tackled by implementing appropriate active fire protection measured, coupled with risk assessment and the development of a strategic approach to fire safety.

The scope for passive fire protection is obviously very limited in historic buildings, so the task of protecting the structure itself, its contents, staff and visitors is best tackled by implementing appropriate active fire protection measures, coupled with risk assessment and the development of a strategic approach to fire safety.

The key word is, of course, "appropriate", as conventional detectors and exposed wiring would be deemed to be defacing many historic buildings. This has led to a fairly widespread use of detection and suppression technology that either does not add any intrusive visual impact or damage the very building – aesthetically or structurally – it has been installed to protect.

Video detection for 14th century Czech chapel

One such example is the Chapel of the Holy Cross situated inside the world-famous Karlstejn Castle in the Czech Republic, which was founded in 1348 by the Bohemian King and Holy Roman Emperor. It is one of the most famous and most frequently visited castles in the Czech Republic. The installation of an advanced FireVu CCTV camera-based video smoke detection system from D-Tec is protecting the Chapel, where magnificent panel paintings make it a structure of major international importance.

The installation is designed to deliver a swift, around-the-clock, response to any fire related incidents without impacting negatively on the unique aesthetics of the Chapel. In this particular instance, the authorities at Karlstejn Castle ruled out the option of installing an aspirated system, as it would involve extensive tubing to draw in air. After surveying the Chapel, it was decided what was required was a single FireVu black-and-white, day/night CCTV camera. To minimise any visual impact this was positioned at the entrance window of the Chapel, where a climate control unit was already positioned. The result was no additional unsightly cabling, and the FireVu networked Digital Video Recorder was fitted elsewhere, out of sight of visitors to the Chapel.

FireVu has the potential to offer 24-hour remote monitoring of fire incidents, with alarm

Grafschafter Castle

and associated video images distributed to an unlimited number of locations for review. In addition, as all alarm events are recorded on the system's Digital Video Recorder, they can be readily accessed for pre and post-event analysis. Testing and diagnosis of the installation can also be carried out remotely.

Early warning at China's forbidden cities

Two projects where the decision was taken to opt for aspirating solutions were at the world-renowned Forbidden City in Beijing and at the identically named Forbidden City in Shenyang, capital of north-eastern China's Liaoning Province, where VESDA technology is now providing early warning smoke detection to avoid the potential destruction of irreplaceable treasures of China's cultural heritage. Today, only a handful of original palaces remain, and both Forbidden Cities have been ravaged by fire several times in the past few centuries.

Constructed predominantly from wood that has dried for centuries, these buildings are an extremely high fire risk. Their construction is often intricate and highly detailed, with timber beams supporting the heavy tiled roof. This forms an enclosed environment where it is difficult for smoke and heat to escape, and where a fire has the potential to cause the building to collapse and be totally lost to future generations. This can all happen in a very short period of time, making it essential that fires are detected early.

The contents of the buildings are also frequently highly combustible, with wooden furniture, curtains and drapes, and painted screens. Old electrical wiring, degraded insulation, inappropriate use of electrical appliances and burning candles all increase the risk of a fire.

The VESDA systems were installed with the detection points concealed within the buildings – positioned in pockets in the ceiling or below ceiling level in buildings with very high ceilings. Even if smoke is diluted by a draught blowing through the

buildings, it will be detected and an alarm raised. Adjustable alarm levels allow the elimination of nuisance alarms, which is particularly important in these public areas to prevent unnecessary panic among visitors. In total, 26 VESDA units were installed in Shenyang Forbidden City, while 23 are safeguarding the Forbidden City in Beijing. A further 108 units will be installed in the Beijing palace in several phases by 2014.

The pipe network that takes air samples to the detector is installed on top of the ceiling beams. Unobtrusive capillary tubes are then attached to draw air samples into the pipes and back to the detector that, along with the associated electronics is hidden from public view in a control room.

Sign of the Hall of Supreme Harmony

Watermist protection for German castle

Grafschafter Castle in Moers, Germany, is a major tourist attraction. Built in 1200, it now houses the Museum Grafschafter, which focuses on the cultural history of the Lower Rhine. It contains many pieces of priceless original furniture. It has recently undergone a complete refurbishment of the electrical installation and the installation of a fire detection and fire fighting system. Due to the wooden floors and the value and scarcity of exhibits, conventional sprinkler technology was considered not to be an option.

Instead, a Fogtec automatic high pressure watermist system has been installed. In addition to limiting the water damage in the event of system activation, other considerations in favour of the Fogtec solution included the very restricted space for pipe, pump and water storage. The pump water break tank was installed in a small ten-square-metre room, and a total of 160 glass-bulb nozzles protect the castle's six floors. The lightness of the small-bore pipes limited the weight imposed on the ceilings and walls that vary greatly in their stability. IFP

Toast, Smoke Detectors and the Healthcare Sector

Graham Ellicott

Chief Executive Officer of the FIA

My daughter is a student and, in order to keep up her calorific uptake, she often resorts to that tried-and-trusted student's friend, the toaster. Now, having been bored to tears by my banging on about the fire industry, she knows better than to insert a slice of her favourite loaf into the toaster if it is near a smoke detector.

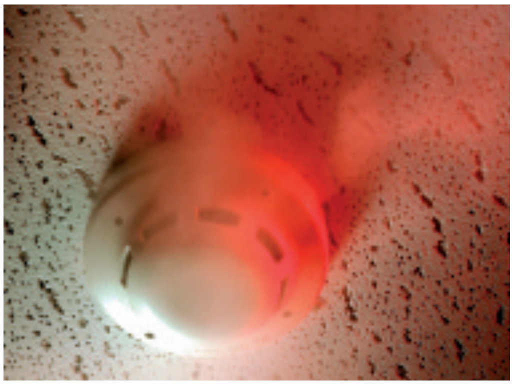
Of course, most students do not understand the possible consequences of this type of action; the smoke detector goes off, the fire and rescue guys come running, and a lot of time and money is wasted. One thing to point out here is that the smoke detector has done its job. I mention this as many people attribute false alarms to equipment malfunctions when in reality a lot of them are about premises management. But it is not only students that burn the toast, cooking in general causes around 45 percent of false alarms in the National Health Service. And a lot of these are also down to toasters!

But help is at hand via the revised Chief Fire Officers Association/FIA False Alarms Policy that attempts to clarify the relationship between those responsible for the protected premises, the fire alarm service provider, the ARC (Alarm Receiving Centres) and the FRS (Fire and Rescue Service). The policy sets out a distinction between what happens at the premises, as it is at this point the alarm signal can be considered a false alarm if it's not caused by a fire. Once the signal leaves the premises and reaches the fire brigade it becomes an unwanted fire signal – unwanted because the FRS want to respond only to real fires. The policy looks at this "fire" signal and how it can be dealt with at the various stages before it reaches the FRS.

So, back to the burnt toast. The smoke alarm goes off but, under the new policy, when the FRS arrives it turns out to be a false alarm, the premises will receive a letter from them asking them to register to the policy. Part of the registration will involve the FRS, the premises and the maintenance provider discussing the best way of managing the problem. This can involve system changes, if appropriate, or in most cases, a change in the management of the system. So in future, if there is a fire signal from the system, there should be a management system in place to investigate the signal before it is transmitted to the ARC or the FRS.

If it is a confirmed fire, the signal is passed to the FRS and they arrive with the appropriate level of response as dictated in their Integrated Risk Management Plan. It is not envisaged that the premises are expected to do a full search of the premises; the fire panel should give them the location of the signal and they should be able to check "safely" if there is a fire or it is a false alarm.

If at a later date another false signal occurs and no management plan is in place, and the false alarm reaches the FRS as an unwanted false alarm, then the FRS can instigate the changes in response level given in the plan, but will still work with the premises to improve the system. If nothing is done and false alarms from the premises continue to still reach the FRS, they will look to take action against the premises under the Regulatory Reform (Fire Safety) Order.



The policy recognises that, in many cases, an alarm at a protected premises never reaches the FRS as it is handled by the management systems; either it was proved to be a false alarm and the call was cancelled, or it was a fire but was dealt with by the "first aid" firefighting equipment.

For signals from Alarm Receiving Centres, the policy presupposes that the on-site checks have been already carried out as part of the contract between the premises and the ARC; so the FRS will arrive as if it's a fire. If it turns out it isn't the same action as above begins.

The policy also treats social alarm providers separately, but they still have to confirm that there is a fire either by call back or their management plan. It also deals with the 999 call to the brigade. The policy is clear that competent persons have a big role to play and that third-party certification is the best method of providing proof of competence with regard to fire alarms.

So if you know any students or healthcare people who like to toast bread, please make them aware of the possible consequences of their actions! IFP

Graham Ellicott is Chief Executive Officer of the Fire Industry Association (FIA)
www.fia.uk.com

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THE GLOBAL VOICE FOR PASSIVE & ACTIVE FIRE PROTECTION

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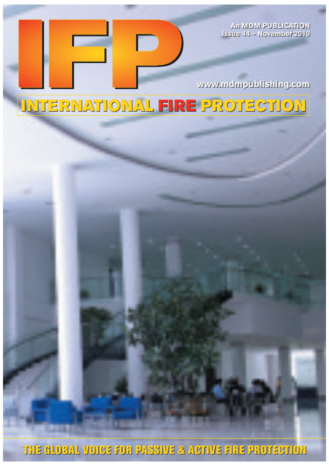

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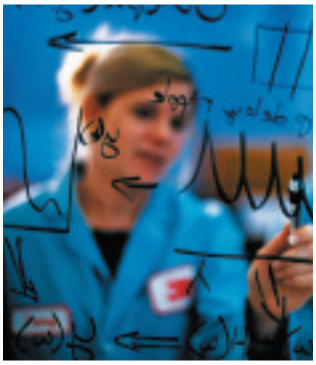
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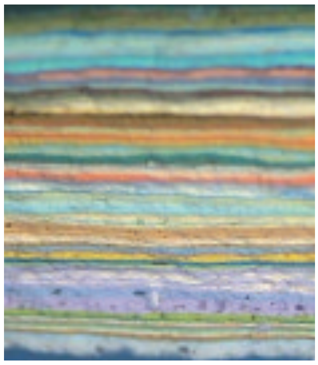
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Graham Collins

Knowledge Empowers

Air travel, we are told, is among the safest means of transport. Interestingly, it is the one that relies least on intuition and self help when it comes to evacuation and safety. Step aboard any flight and you will be treated to a detailed safety and evacuation presentation.

So, are we missing a point here? Across the globe, millions are spent on fire detection and alarm installations and fire suppression in buildings, but are we doing enough for those caught up in an emergency to give them the best possible information on what to do – or what not to do – and when to do it? Clearly, it is impractical to give every visitor to a shopping mall, leisure centre, theatre or hospital the "flight attendant" treatment, but any measures that make people more aware of what is the most appropriate thing to do in an emergency are surely to be encouraged.

The faster the detection and alarm equipment responds to a fire, the more time people are likely to have to make rational evacuation decisions. Important though that is, it is only part of the story. After all, communication is not the message that is transmitted; it is what the listeners perceive that message to mean. For example, an alarm sounder is intended to transmit an alert, but in some circumstances what it can possibly be communicating is panic. If you doubt this, watch the reaction of a stressed young mother with toddlers in tow, ladened down with shopping, when an alarm bell is activated in an unfamiliar crowded shopping mall.

The evacuation challenge is further compounded by the fact that we do not all have the benefit of perfect hearing, and a recent solution to aid people with this disability, one that harnesses cellphone technology, is described in this edition.

Of course, panic is not induced solely by fear of the unknown or confusion. There is the potential for it to ensue even with the most sophisticated voice alarm systems, because what we see can be equally as important as what we hear – and in a panic-ridden environment may possibly rank as more believable or reliable. You only have to watch the behaviour of people subjected to billowing smoke to appreciate the significance of that argument. So, in this edition of the magazine we have also included an article on smoke ventilation from Hilson Moran, one of the world's premier fire engineering consultancies.

Elsewhere in this edition we have included the annual fire alarm panel buyers' guide, looked at flame detection, and delved into important parts of EN54. There are also articles on third-party testing and certification, fire-rated paint and beam detection.

Also, following the introduction in the previous edition of International Fire Protection of a codes and standards update section, where the latest NFPA standards and codes were reviewed, this time we have included a brief overview of the latest British Standards. Alongside this we have introduced another new section on upcoming industry events – fire safety exhibitions and conferences around the world.

Finally, returning to the subject of transport fire safety, the watermist feature in this edition looks at the latest systems designed specifically for tunnels and trains. We also look at the practical application of this technology with an article on the system installed in what was once regarded as one of Spain's most dangerous tunnels. IFP

Beam Me Up Fireray

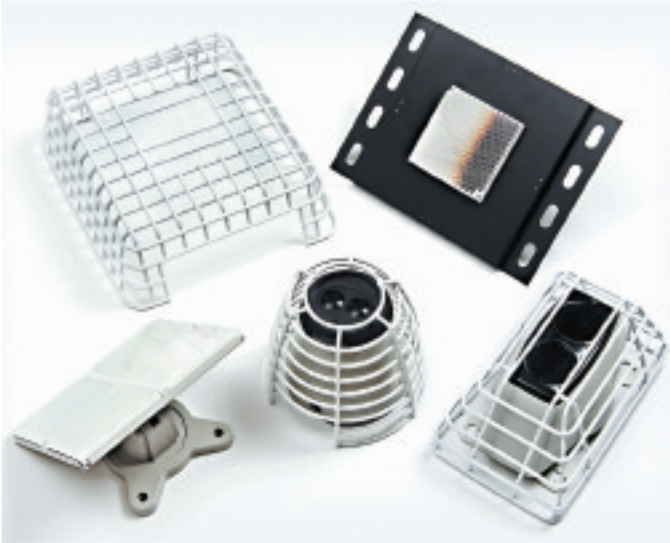
A full range of installation accessories for use in its Fireray optical beam smoke detectors has been introduced by FIRE FIGHTING ENTERPRISES LTD.

This new line-up includes various mounting plates and brackets for the reflector prisms that are said to allow easy fixing and positioning of either a single-prism or four-prism array to surfaces at almost any angle. Protective cages for the Fireray 5000 detector head and controller units are also available, as are those for the Fireray 50/100R and Fireray 2000 models.

The prism plate for either one or four-prism array is suitable for where the wall facing the detector head is perpendicular to the angle of the beam. Where this is not the case, the prism plate can be attached to a universal bracket that fixes to the wall, allowing the angle of the prisms to be adjusted to reflect the beam correctly. A reinforced surface mount plate is another option, providing a particularly rigid and secure fixing.

The protective cages are made from plastic-coated galvanised steel and will protect detector heads and controller units from accidental knocks or flying objects.

For more information go to www.ffeuk.com



Outstation Boost For Disabled Refuge System

C-TEC has launched four new outstations for its SigTEL disabled refuge system/ emergency voice communication system.

The new surface-mounted EVC302GS disabled refuge outstation is reckoned to be easy-to-clean and ten percent cheaper than its stainless steel counterpart. A flush mount version is also available, and both models enable two-way emergency communication between disabled refuges and building control. In keeping with C-TEC's other Type B outstations, the new EVC302G can also be connected to an induction loop system/CCTV camera or interfaced to a disabled persons' toilet alarm system.

C-TEC has also unveiled the EVC301RPO fire telephone outstation that includes a telephone handset in a red, push-to-open steel cabinet. A version with a "lift key" locking mechanism is also available. Both can be surface or semi-flush mounted.

For more information go to www.c-tec.co.uk

Polish Buses Get Dedicated Fire Protection

More than 500 buses in Poland are now being protected by FIRETRACE INTERNATIONAL's FIRETRACE® automatic fire detection and suppression system. 450 systems are being installed in buses operated by MZA – Miejskie Zakłady Autobusowe Sp z.o.o – in the capital, Warsaw, while a further 75 are being installed in buses in the city of Poznan. The systems are being fitted to protect the engine compartments of the cities' existing buses, and it is the largest single order ever won by Firetrace International's UK-based EMEA operation.

The bulk of the order – 380 FIRETRACE systems – is being installed in the 12-metre Solaris Urbino 12-metre and the 18-metre articulated Solaris Urbino 18 buses. The order was won in the face of stiff international competition and the decision is said to have been influenced by the fact that the system is already being used to protect over 5,000 vehicles. Firetrace International was also able to show that there has not been a single reported instance where a FIRETRACE system has either false alarmed or failed to detect and suppress a genuine fire.

For more information go to www.firetrace.com

Sound Investment

COOPER FULLEON'S continuous improvement initiative has invested in numerous projects since the beginning of 2010. The end result, the company says, is a slicker, more effective operation that ensures the delivery of superior service and support to customers.

Lean Manufacturing continues to be employed on site and this year has seen a major change to the way production operatives work. Conventional bench-seated stations have been replaced by standing work stations, reducing down time and defects as well as benefiting operatives' posture. Jan Westacott, production operative says: "I feel less tired than when I used to be sitting down and the process flows much better."

The building and commissioning of an anechoic chamber has also been completed on site. This is capable of achieving up to 100 percent sound attenuation, improving the accuracy and integrity of sound level measurement during product testing. It has a suspended floor and its walls, ceiling and floor are covered with over 500 acoustic foam tiles that are critical to reduce the reflection of reverberation when measuring the sound output of products.

Cooper Fulleon's new Customer 1st programme includes the introduction of an online customer centre, Cooper Customer Centre (C3), which allows customers to track orders and price and check availability of products quickly with ease. The introduction of a new telephone system to streamline call handling ensures all calls are answered efficiently.

These initiatives represent the commitment to delivering value and supporting customers every step of the way. Cooper Fulleon will continue to invest in improvement measures and the final months of 2010 will see the launch of a new improved quick delivery service. The 'Xpress Service' catalogue features the most frequently requested products with a reduced lead time.

For more information go to www.cooperfulleon.com

Beam Detector Is Auto-Aligned

A conventional auto-aligning beam detector with laser alignment has been added to APOLLO FIRE DETECTORS' range of fire detection products. Specifically designed to detect smoke in large, open areas such as warehouses, hangars, theatres, churches and sports centres, it has a range of eight metres to 100 metres.

During installation, a visible laser is used for initial alignment of the beam. An automatic, motorised auto-alignment feature then ensures that the beam remains on target, counteracting the effects of building movement. Automatic optimisation technology also compensates for dust build-up on the lens, ensuring that false alarms are avoided and the system continues to work effectively over time. Up to four detectors can operate from one single low-level controller, minimising installation costs and allowing full control of the detector heads without the need for expensive lifting gear.

The product has worldwide approvals including EN54:12 and can be loop-powered using a switch monitor or mini switch monitor, enabling it to be added on as an extension to existing Apollo analogue addressable systems.

For more information go to www.apollo-fire.co.uk

ASD System Gives Airport Safety A Lift

The XTRALIS ICAM aspirating smoke detection (ASD) system is being used to provide early warning fire detection in lift shafts throughout London Gatwick Airport. It is the UK's second largest airport and the busiest single-runway airport in the world, serving more than 200 destinations in 90 countries with around 33 million short- and long-haul passengers a year.

The installation works by actively drawing air through sampling holes in a network of pipes that are installed along each elevator shaft and in the elevator machine room. However, while the sampling pipes are installed within each lift shaft, the actual ASD technology remains outside. Air samples are then analysed by the ICAM unit that is placed within the machine room, ensuring ease of access for testing and maintenance requirements.

Lifts are a critical component of building infrastructure, particularly in busy passenger terminals, and the ICAM solution was chosen because of its ability to identify the location of the earliest presence of smoke.

For more information go to www.xtralis.com/lifts

Gas Detection & Environmental Monitoring Added To Vesda Systems

XTRALIS™ has expanded its VESDA aspirating smoke detection [ASD] system with the inclusion of gas detection and environmental monitoring. VESDA ECO™ by Xtralis uses new or existing VESDA pipe networks to reliably detect smoke in addition to hazardous/combustible gases to ensure air quality. It integrates easily with other building management systems for real-time situation awareness and intelligent emergency response, including the activation of demand-controlled ventilation.

VESDA ECO is already being used in a power plant in South America, car parks in Europe, and a data centre, national laboratory, wireless telecom facility and historical display in the USA, providing very early warning fire detection, protecting against hazardous gas leaks, monitoring air quality to ensure safe working environments, and help reduce energy consumption and costs.

With an ECO detector installed on a VESDA pipe network, air can be conditioned or filtered to remove moisture, dirt and other particulates that, Xtralis says can cause traditional gas-detection systems to false alarm or become contaminated. As with fire detection, early warning of gas leaks or build-up enables counter-measures to be taken to protect personnel, property and business operations.

In its initial release, the solution can be configured to detect ammonia, carbon monoxide, hydrogen, hydrogen sulphide, methane, nitrogen dioxide, oxygen, propane and sulphur dioxide. The systems integrate easily with fire alarm control panels, programmable logic controllers, heating ventilation and air conditioning systems, and building management systems.

For more information go to www.xtralis.com

New Panel Mount Sounder Is Intrinsically Safe

E2S has added a new product to its intrinsically safe range of sounders and beacons, the IS-pA1 panel mount sounder, which is certified II 1G Ex ia IIB T4/5/6 for use in Zones 0, 1 and 2. The IS sounder is said to be ideal for use as fault indication or process alarm in control panels located in intrinsically safe environments. It produces a 100dB (A) at one-metre continuous 600Hz tone that can be pulsed externally to produce different signals.

To reinforce the audible warning signal, E2S also offers the intrinsically safe IS-pB1 panel lights. The high efficiency LEDs, which are mounted behind red, amber, green, blue or clear lenses, have a typical operating life in excess of ten years. Powered via Zener barriers or galvanic isolators, the panel mount sounder and lights produce reliable and cost-effective status indications with minimum power consumption.

The E2S IS range also includes the IS-mini sounder, beacon and combined units, as well as the IS-L101L LED beacon and the IS-A105N sounder, which are approved to ATEX, IECEx and FM.

For more information go to www.e2s.com

Remote Monitoring Option For Fire Pump Systems

Continuous remote monitoring of fire pump systems' status from anywhere in the world is the promise behind SPP's new FireEye, which was developed specifically for the fixed fire protection market. Utilising General Packet Radio Service (GPRS) and SMS text alarm module technology, up to four devices can be monitored, plus there is provision for monitoring additional pump room alarms, such as intrusion alarms and valves.

FireEye is compatible with SPP fire pump packages and other manufacturers' equipment, and can be integrated into existing and new fire pump installations where a combination of electric starters and diesel fire pump controllers are used. Data can be logged, accessed and monitored remotely via the Internet and, as standard, FireEye communicates a system status that is logged to the web server every hour, although it can be easily set more or less frequently to suit individual requirements. Additional notification of system alarms via email to pre-determined accounts is also simple to enable. Each site, its system status, and even individual device history is recorded and logged on a database for future accessing.

SMS information is sent to up to five pre-determined and prioritised contacts. If the receipt of alarms via text is not confirmed by the first allocated contact, the message is relayed to the other nominated numbers. Global Positioning System (GPS) technology provides continuous information to aid locating a site and reduce travel time to it.

For more information go to www.sppfireeye.com

Industry Gets Compact Smoke Detector

Manufacturer of conventional and addressable fire detection products, NITTAN, has launched a conventional smoke detector for industrial use where space is at a premium.

The 0KB3 works on the principle of scattering light detection, measures just 40mm by 40mm by 45mm, weighs 55g, and is aimed at applications such as transport containers, aircraft toilets and computer racking systems. It is said to be extremely rugged and capable of coping with the most demanding of environments, providing reliable fire detection with a high degree of protection against unwanted false alarms, plus it automatically adjusts its detection sensitivity against dirt.

It can be used with Nittan's CPC-3 Control Panel, and up to 20 0KB3 smoke detectors can be used with a single CPC-3 Control Panel.

For more information go to www.nittan.co.uk

UL & FM Endorsed VSD Detection

FIKE VID has received UL Listing on its SigniFire video smoke detection system. Approved to the new UL 268B standard for video smoke detection, it is the only system to have both the UL listing and FM approval.

Offered as a turnkey solution for video smoke, flame and intrusion detection, SigniFire is a camera-based detection system that visually detects the presence of smoke or fire at its source, independent of airflow. It provides early warning fire detection, identifying and reacting to fire situations in their earliest stages, and is used in applications where traditional smoke detection technologies may not be practical or efficient, including fossil fuel power plants, nuclear facilities, industrial facilities, cultural properties, warehouses and tunnels.

For more information go to www.fike.com

Dual Wavelength Detector

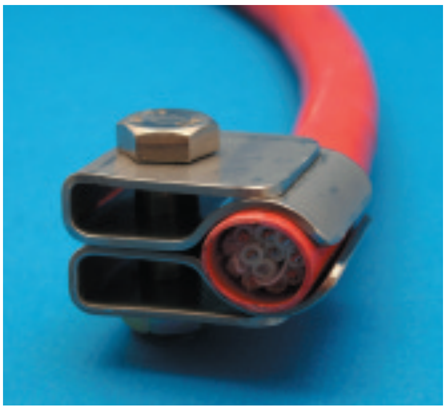
A fire detector that is said to reduce false alarms by accurately differentiating smoke particles from other types of gas, steam and dust has been launched by EUROTECH FIRE SYSTEMS.

The newly patented dual wavelength optical detector offers a "flat response" to detect all types of fires, and is being promoted as an ideal solution for large public buildings, such as hotels, schools and healthcare facilities, where false alarms can have a significant impact on daily activity.

The new optical detector is one of a range of fire detection products being made available under Eurotech's new Making Every System Happen (MESH) protocol. This offers both "closed" and "open" fire detection protocols to fire detection and alarm installers worldwide, ensuring that installers are not tied to the one manufacturer for all system components or long-term maintenance contracts.

For more information go to www.eurotechfire.com

Cleated-Up



A range of fireproof cable restraint cleats designed for the installation of fire-rated cables has been introduced by ELLIS PATENTS. The Phoenix range is manufactured from corrosion-resistant 316L stainless steel, is available in 11 sizes, ranging from 10mm to 65mm, and features a single bolt fixing.

In order for FP rated cables to continue working in an emergency they need to remain not just intact, but in place – something that simply cannot be guaranteed without the use of restraints that have the same fire resistant properties as the cables they are restraining," said Ellis Patents' Managing Director, Richard Shaw.

The new cleat was developed in conjunction with Exova Warringtonfire, BRE and ETS Cable Components. The companies developing a testing process that most realistically reflects the conditions the cleat might experience in service, and to ensure that they achieved fire protection to the same level as the cables they are installed to support. These tests included exposure to fire, impact and water spray.

For more information go to www.ellispatents.co.uk

Upcoming Events

Firex India 2010

23rd – 25th November 2010
Bombay Exhibition Centre, Goregaon, Mumbai, India
www.firexindia.com

Middle East Fire, Safety and Security Exhibition

4th – 7th December 2010
Cairo International Convention Center, Cairo, Eqypt
www.mefsec-middleeast.com

International Fire, Rescue & Emergency Expo 2010

8th – 10th December 2010
Jakarta International Expo, Jakarta, Indonesia
www.ifreeexpo.com

Intersec 2011

16th – 18th January 2011
Dubai International Convention and Exhibition Centre, Dubai, United Arab Emirates
www.intersecexpo.com

FDIC 2011

21st – 26th March 2011
Indiana Convention Center & Lucas Oils Stadium, Indianapolis, IN, USA
www.fdic.com

International Firex 2011

16th – 19th May 2011
Hall 3, National Exhibition Centre, Birmingham, B40 1NT
www.info4fire.com

NFPA Conference & Expo 2011

June 12th – 15th 2011
Boston Convention Center, Boston, MA, USA
www.nfpa.org

Standards Round-Up

Watermist systems, fire detection and alarm systems and fireguards focus in the latest batch of Drafts for Development, Codes of Practice, and Standards published by BSI.

DD 8458-1:2010

Fixed fire protection systems.

Residential and domestic watermist systems.

Code of practice for design and installation

DD 8458-1:2010 is a Draft for Development giving recommendations for the design, installation, water supplies, commissioning, maintenance and testing of watermist systems with automatic nozzles installed in residential occupancies not exceeding 20 metres in height and domestic occupancies. It primarily covers watermist systems used for life safety, but might also provide property protection. It does not cover watermist systems in industrial and commercial buildings.

Watermist fire suppression system maintenance although not complex, is essential. It is important that owners and occupiers pay particular attention to precautions issued by the watermist system supplier, such as the avoidance of obstructions to the watermist nozzle, or the painting of the watermist nozzle or its mounting.

The advent of watermist nozzles that operate at an earlier stage in the development of a fire, together with the recognition that the largest numbers of deaths from fire occur in the home, have led to the introduction of watermist fire suppression systems specifically designed for residential and domestic occupancies. Watermist fire suppression systems have demonstrated their value in assisting the protection of life and property in industrial and commercial applications for many years.

BS 5839-9:2010

Fire detection and fire alarm systems for buildings.

Part 9: code of practice

This part of BS 5839 has been prepared to give guidance to those who specify, design, manufacture, install, commission, service and use such emergency voice communication systems. It also ensures that high standards of reliability, safety and security are achieved, together with acceptable standards of performance.

Emergency voice communication systems, as defined in BS 5839-9, are used in connection with life safety and need, therefore, to be subject to high standards of design, manufacture, installation and servicing, similar to those covering fire detection and alarm systems and voice alarm systems.

This standard primarily relates to the use of emergency voice communication (EVC) in assisting both firefighters and those responsible for evacuating buildings or sports stadiums in fire emergency situations, including evacuation of disabled people. Use, other than in fire emergency situations, by disabled persons and others, although not precluded, is not addressed in detail.

BS 5839-9 covers systems with components linked by wires, wirelessly, or a combination of both and emergency voice communication systems. This standard does not recommend whether or not an emergency voice communication system should be installed in a given premises.

BS 8423:2010

Fireguards for fires and heating appliances for domestic use. Specification

BS 8423 specifies the requirements and test methods of fireguards intended for use with heating appliances utilising organic fuel or electricity, and which can be situated in an open area or against or on a wall, or within a recess.

The fireguards specified are intended to protect people from falling into a fire, prevent burns and reduce the risk of injury, particularly to young children and the infirm. In addition it is intended to reduce the risk of fire resulting from clothing and/or other flammable materials coming into contact with, or in proximity to, burning fuel and/or hot surfaces.

This is a full revision of the standard, and introduces new requirements for fixings, requirements regarding small parts, and increasing the aperture of mesh, while the requirements regarding shearing and crushing have been deleted. BS 8423 supersedes BS 8423:2002, which is withdrawn. IFP

More information on these and the other recently published British Standards can be found at shop.bsigroup.com

Flat and Flattering Fire Detection From Apollo

Fire detection is a life critical requirement in all types of building, but sometimes it can cause conflict.

Architects who have worked hard to create a prestige office building or a sleek retail experience can find that their design vision is compromised by the need to install standard fire detectors, which protrude from the ceiling. Even a low-profile detector can interrupt the clean lines of many modern interiors.

Heritage buildings are another environment in which the need to preserve aesthetics and the need for fire detection can collide. Between January 2002 and June 2006, an average of seven heritage buildings a month were lost or damaged as a result of fire in the UK. Fire detection in heritage buildings is therefore imperative, but it can be very difficult to incorporate modern fire detectors into heritage interiors without interfering with the original décor.

This conflict between style and function is being addressed in the latest generation of fire detection products. Apollo Fire Detectors Limited has developed Plateau; a new smoke detector that can meet stringent design demands without compromising on reliability. Plateau is flush-mounted to the ceiling so only a discreet white plastic cover plate is visible. This greatly reduces the device's aesthetic impact and means that ceiling lines are virtually uninterrupted.

The signature flat profile is possible due to the fact that Plateau detectors do not have an internal smoke chamber – instead, smoke particles are detected outside the device itself. Plateau operates as an optical detector, but the light beam is transmitted through the cover plate and reflected by any smoke close to it. The light that is reflected is registered by a receiver in the detector, which will change to the alarm state if the presence of smoke is confirmed.

Plateau's aesthetic credentials are not limited to the fact that it sits flush-mounted to the ceiling; the appearance of the detector also helps it fit the design brief. The simple plastic cover is minimalistic with no lines or moulding and is pure white, with no logos or other branding visible. So when discretion is required, Plateau is able to provide reliable and accurate fire detection with minimal visual intrusion.

In order to aid reliability and accuracy, Plateau has a number of inbuilt features. The device permanently checks for contamination on the

cover plate by means of additional light-emitting and sensing components. It gauges the degree of contamination present and adjusts its alarm threshold accordingly. The device will raise a fault condition if contamination is excessive.

Plateau's discreet presence is also finding favour in security applications. Apollo has created a special vandal-resistant version that comes equipped with a 100mm square, 4mm thick stainless-steel plate instead of the standard plastic cover. This version has been developed for use in environments such as secure units in a hospital, detention centres, prisons or police holding cells where standard fire detectors could be easily vandalised.

In summary, often a vast amount of time and money has been spent on building design, so it is understandable that developers and architects want to ensure that their vision is not compromised by utilitarian equipment. However, the fact remains that any public access building must have adequate fire protection.

The evolution of Plateau makes it possible for the demands of style and function to be met in both modern and heritage environments. In addition, the security version of this device means that some of the most vulnerable people in our society cannot use a product intended for their protection to do any harm to themselves or to others. IFP

For more information go to www.apollo-fire.co.uk

Steelguard Intumescent Coatings

PPG Protective & Marine Coatings has extensive and varied experience in the domestic, commercial and industrial cellulosic fire protection markets, with systems designed to meet the needs of almost every kind of environment.

PPG Protective & Marine Coatings global network of project specialists are available to ensure that the correct fire protection systems are specified for each individual project, working closely with architects, main contractors and engineers. This world-class customer service and commitment to manufacturing consistently the highest quality products underpins PPG's position as a world leader in the fire protection industry.

Steelguard thin-film solution for nuclear sector

The UK nuclear market is an area in which PPG has provided an alternative solution to the more traditionally-accepted thick-film intumescent coatings.

Previously, even where hydrocarbon fire protection was not a requirement, engineers looked to specify the more durable epoxy thick-film intumescent coating. This was down to several contributing factors, such as the harsh corrosive environments and coastal conditions to which the steelwork would be exposed during the erection period, and the certification and approvals required in the oil, gas and petrochemical markets.

There are, however several drawbacks to using this type of fire protection when compared with the thin-film intumescent alternative:

1 The application of a thick-film epoxy intumescent coating requires specialist equipment.
2 Expert training must be give to applicators wishing to apply thick-film fire protection.
3 Mesh re-enforcement is often needed for larger steel section profiles.
4 The higher costs involved with thick-film fire protection.

Sellafield Ltd has undergone an extensive construction programme with several new facilities being constructed; more might be built over the next few years. So, any proposed system had to not only be durable enough to satisfy the corrosive environment the steelwork would be exposed to during the initial construction phase, but more importantly it required a suitable topcoat with the necessary decontamination approval to satisfy Sellafield Ltd.

In this instance, the solution put forward by the PPG Cellulosic PFP team was to devise a cost effective alternative to thick-film that called for an off-site-applied thin-film intumescent fire protection system. A system was put forward that included zinc rich primer, Steelguard solvent-borne thin-film intumescent coating for the required fire resistance, over-coated with a suitable epoxy tie coat with PSX 700 applied as the final protection to the steelwork.

PSX 700 is a patented engineered siloxane coating that embodies the properties of both a high-performance epoxy and polyurethane in one coat. The coating offers "breakthrough" weather resistance and corrosion control. It also has the required decontamination properties and approvals. As a result of the innovative specification put forward by PPG, Steelguard intumescent coatings are now a well established in the UK nuclear construction market.

Steelguard – working in partnership with architects and engineers

Steelguard thin-film intumescent coatings are being specified by architects and specifiers across the globe as part of complete fire protection systems. PPG Protective & Marine Coatings' engineers have the essential expert knowledge to devise fire protection specifications to meet precisely the specific needs of clients, guaranteeing the longevity and performance expected from the system. IFP

For more information go to www.ppgpmc.com

PROTECTIVE COATINGS

solutions that cover your needs

STEELGUARD®

Proven fire protection for civil building

- Up to 120 minutes fire protection
- National and international certification
- On-site and off-site application
- Engineering support

Chemguard Concentrates, Hardware & Support

A full-service ISO 9001:2008 certified manufacturer of UL and FM approved fire suppression foams, equipment, and systems, Chemguard serves the fire suppression and specialty chemicals fields worldwide through innovative research and development, advanced engineering and design, precision manufacturing, and prompt service and delivery.

Based in Mansfield, Texas, Chemguard has been listed among the 100 fastest growing private companies in the Dallas, Texas, region for the past two years.

Overview

The comprehensive operation of the Chemguard Foam Fire Suppression Division includes foam concentrate development and production, firefighting foam equipment engineering and manufacturing, and foam systems design. Our efficient and environmentally friendly UL-listed and FM-approved foam products are used worldwide in challenging industrial, military, municipal, offshore, petrochemical, energy, transportation, freight and airport applications.

Chemguard designs and manufactures an extensive line of firefighting foam hardware, including nozzles, monitors, and foam trailers. We also offer on-site product fabrication, including ASME bladder tank and custom foam skid fabrication. Our intensive quality control procedures ensure that equipment shipped from Chemguard reflects our reputation for excellence and is delivered on-time at competitive prices.

In addition, Chemguard manufactures advanced positive-displacement foam concentrate pumps for fire-protection systems and fire apparatus. Chemguard's balanced vertical integration allows us to ensure the integrity of our foam fire-fighting equipment by controlling the manufacturing process – from raw materials through quality assurance testing and final delivery.

Chemguard's systems engineers provide fire suppression systems design and applications assistance – reviewing specifications, providing value-added engineering alternatives, and supporting systems start-up. Working side-by-side with customers, we apply years of experience designing systems for petrochemical facilities, hangars, flammable-liquid storage tanks, warehouses, marine applications, and other challenging installations to maximise performance, efficiency, and effectiveness.

The company performs topside and sprinkler fire tests for a wide variety of test standards at our on-site fire test facility, obtaining international approvals for Chemguard foam concentrates, including IMO, LASTFIRE, DNV, and EN 1568. We are committed to continuous innovation to meet customer requirements and market demands. In recent years Chemguard has expanded its laboratory facility and invested in additional state-of-the-art equipment. Our research staff collaborates with customers to address specific application requirements.

Chemguard designed-and-built bulk foam storage/transport trailer

Chemguard's research-based Specialty Chemicals Division produces environmentally responsible fluorochemical surfactants (a major ingredient in fire-suppression foam concentrates) for Chemguard as well as other firefighting foam manufacturers worldwide.

We are committed to protecting the environment while supplying products that will effectively protect people and structures, equipment, and other property. Because of Chemguard's successful synthesis of fluorochemical surfactants from telomer-based fluorocarbons, our fire-fighting foam concentrates do not contain perfluorooctane sulfonate (PFOS) or perfluorooctanoic acid (PFOS) ingredients.

Williams acquisition

During summer 2010, Chemguard acquired Williams Fire & Hazard Control as a wholly owned subsidiary, combining Chemguard's extensive R&D, manufacturing, and systems engineering experience with Williams' unmatched expertise in flammable-liquid firefighting – effectively integrating surfactant research, foam pump design, systems development, and firefighting technical expertise.

Chemguard and Williams – also based in Texas – enjoy a history of collaboration. In late 2009, they introduced an advanced alcohol-resistant aqueous film-forming foam (AR-AFFF). Developed in Chemguard's R&D laboratory to Williams' rigorous specifications, this "next-evolution" concentrate exhibits significant improvements in effectiveness and efficiency and exceeds the highest performance standards in the industry.

Chemguard and Williams are committed to continued development of foam concentrates, fire-fighting equipment, fire-fighting systems, and emergency services. IFP

For more information go to www.chemguard.com

Introducing EN12845 FIRE PUMP LINE

Patterson Pump Ireland Ltd. specialises in the production of world class fire protection equipment around Europe.

From enquiry stage, right through design, manufacturing, installation and after sales service, Patterson Pump Ireland strives to provide a quality, reliable fire protection system, at the most competitive price.

EN12845 provides a pan-European standard for the design, installation and maintenance of automatic sprinkler systems, and encompasses the basic requirements set forth by local rules into one European Standard.

The new Patterson Pump End Suction product line is the latest addition to the Patterson Sentinel™ range. Cost effective and efficient, these will be used in fire pump packages specifically designed and built to comply with the regulations of European standard EN12845, along with other local rules.

PATTERSON PUMP IRELAND LIMITED
A Subsidiary of Patterson Pump Company U.S.A.
Unit 14, Mullingar Business Park • Mullingar, Co. Westmeath, Ireland
Tel.: 353 44 934 7078 • FAX: 353 44 934 7896
E-mail: info@ie.pattersonpumps.com

www.ie.pattersonpumps.com

Pumping Technology for Tomorrow's World

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LPCB UKAS PAVUS CE CNBOP VdS

Member of: Hydraulic Institute

Bosch Dual Ray Te Provides Faster Fi

New additions to Bosch's Fire Detector 420 Series provide even faster fire detection than was previously possible, along with reduced rate of false alarms, ensuring that the series offers maximum reliability in all conditions and environments.

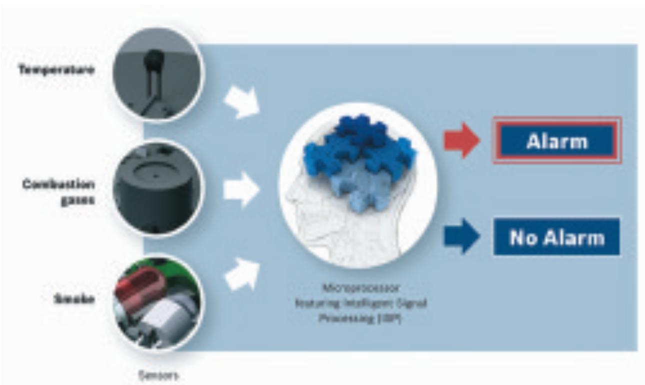
Although no two fires are the same, they all have certain obvious characteristics in common, including the generation of heat, smoke and combustion gases. Detecting any one of these can give early warning of a fire, but can also lead to false alarms due to other particulate material being mistaken for smoke. That is why multi-sensor detectors were developed by companies such as Bosch Security Systems with products such as its ground-breaking FAP-OTC 420 optical, thermal, chemical multi-sensor introduced 2001. Where Bosch's Fire Detector 420 Series really scores, however, is in the leading-edge algorithm embodied in the company's Intelligent Signal Processing (ISP) technology, which enables the 420 Series to achieve the highest level of intelligent fire detection.

ISP enhances multi-sensor performance

In general, the more sensors a fire detector has, the earlier it can detect a fire and the fewer false alarms are generated. This is particularly true of the multi-sensors in Bosch's Fire Detector 420 Series. They feature the company's unique and powerful ISP technology, through which all sensor signals are pre-processed continually by dedicated internal evaluation electronics, analysed and linked with each other via a built-in microprocessor.

The sensor signals are processed by a powerful algorithm developed using data from fire tests and tests with known disturbance values. The algorithm itself is based on rules derived from the experience of 5000 fire patterns. An alarm is triggered automatically only if the signal combination of the sensors corresponds to the specific pattern for a real fire. In addition, the multi-sensor algorithm parameters are adapted to application type to further optimise early fire detection and false-alarm immunity. They also enhance immunity from ambient influences such as dust, humidity and temperature variations. This ensures best-in-class differentiation between real fires and disturbances.

Not content to rest on past successes, the company has recently introduced three new variants to the 420 Series embodying innovative Dual Ray technology that, in combination with ISP, offers ultimate precision in smoke detection.



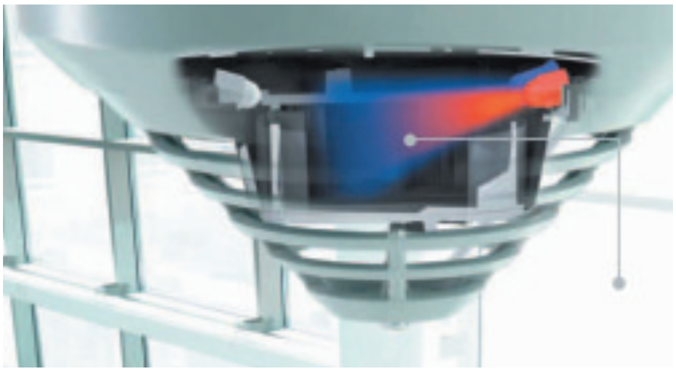
Earliest detection of even the smallest smoke particles

Bosch formerly offered four sensor variants in the 420 Series: the FAH-T 420 (heat detector), the FAP-O 420 (optical smoke detector), the FAP-OT 420 (multi-sensor detector optical, thermal) and the FAP-OTC 420 (multi-sensor detector optical, thermal, chemical). With the exception of the FAH-T 420, all feature a single optical smoke detector. The series has now been extended with new detector variants featuring a dual-optical smoke sensor based on the company's Dual Ray technology.

For more information go to www.boschsecurity.com

chnology
re Detection

It is commonly known that distinguishing between steam, dust particles and smoke particles can be a challenge for some detectors. They also find it challenging to detect very light smoke with small particles produced by some open wood fires, particularly what are known as open cellulosic (wood) fire defined in practical tests as TF1 fires. In the past, smoke from such fires could only be reliably detected using multi-criteria sensors or ionization detectors, the latter incorporating a small amount of radioactive material that detects any invisible smoke particles floating in the air and sets off an alarm.



Ultimate precision with Dual Ray Technology

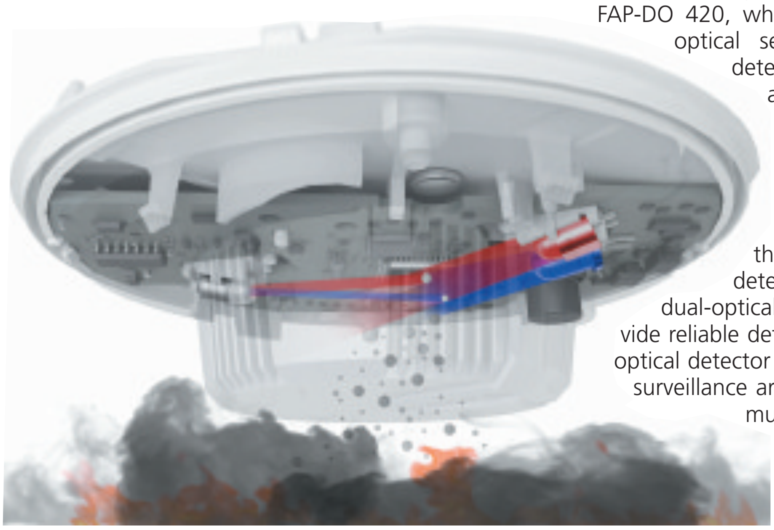
Some manufacturers have attempted to address this challenge using a combination of thermal sensor and dual-optical sensor based on forward and backward scattering of light from two LED sources of the same wavelength. First described by Gustav Mie in 1908, the Mie theory describes the scattering of light by particles larger than a wavelength. It is responsible for the white light in mist and fog and the white glare around street lamps. Mie scattering is strongly dependent on particle size – the larger the particles, the stronger the intensity of scattered light in the direction of the incident light.

Bosch adopted quite a different dual-optical approach in its new precision Dual Ray technology. Although this is also based on the Mie scattering effect, Dual Ray technology takes advantage of the effect to determine smoke density and particle size from the ratio between the intensity of scattered light from two LED sources of differing wavelength (one infrared LED and one blue LED). The smoke density and particle size are used by the detector's powerful fire-detection algorithm to provide even more reliable differentiation between smoke particles and other particles caused, for example, by disturbances such as dust and steam. This leads to earlier, more reliable fire detection and fewer false alarms.

Three new variants featuring Bosch's new dual-optical sensor are being added to the FAP-420 Series – the FAP-DO 420 (dual-optical smoke detector), the FAP-DOT 420 (multi-sensor detector dual-optical, thermal) and the FAP-DOTC 420 (multi-sensor detector dual-optical, thermal, chemical). Their addition, which brings the total number of detectors in the series to seven, means that the 420 Series now provides optimal choice of detector variants meeting all likely application requirements.

A unique combination

As with the original members of the series, the new variants also feature Bosch's ISP technology, providing a unique combination of precision Dual Ray technology and the company's powerful fire-detection algorithm. They are all capable of detecting challenging TF1 test fires – even the FAP-DO 420, which embodies only the dual-optical sensor – and are the first detectors attested by VdS to TF1 and TF8, in addition to the required test fires of EN54-7.



Moreover, the dual-optical FAP-DO 420 offers a significant cost advantage over some competitor systems that require a multi-sensor detector (optical and thermal or dual-optical and thermal sensors) to provide reliable detection of TF1 fires. The dual-optical detector can also make full use of the surveillance area at all times, in contrast to multi-sensor detectors in which the surveillance area may be reduced in certain operating modes, for example, thermal only. IFP

New Voice Alarm Command Centres

ADVANCED FIRE SYSTEMS has launched the AVISA Voice Alarm Command Centres to complement and extend its AX Series fire panels and provide distributed digital audio, firefighters' telephone and multiple command centre controls capabilities. Applications include high-rise and campus style, wide-area network applications that demand the most stringent engineering specifications.

The combined AX Series and AVISA product range, comprising 1-loop, 2-loop, and 4-loop integrated systems, shares a full range of advanced intelligent detection devices as well as system peripherals including remote LCD and LED annunciators, graphics controllers, BMS interfaces, in-built panel printers, power supplies, audio boosters and firefighters' telephones.

The products utilise the latest in surface-mount and flash-based microprocessor technology, and standard features include integral intelligent voltage and ammeters that aid installation and trouble-shooting. The IP Gateway™ provides a low cost solution for remote monitoring via email and alert text messages of alarm and/or fault conditions, while Windows-based programming tools offer simple select-and-click programming with built-in logic and error checking diagnostics.

For more information go to www.afsi.us.com

VDS and BSI Approved Fire Panels

ADVANCED ELECTRONICS has launched phase one of the Mx-5000 series of analogue addressable fire control panels making it, the company says, the first UK-manufactured panel to be approved to EN54 part 2, 4 and part 13 by VDS and BSI.

New features include improved diagnostics showing a visual oscilloscope, fire database management system, up to 2000 network zones and up to 200 control panels on a fault-tolerant network system. The product range, comprising a single-loop, dedicated 2 and 4-loop control panel series also includes a number of remote terminals and dedicated peripherals and uses the latest in flash-based micro-processor technology combined with high intensity, fully programmable LCD Displays. .

In addition to this, the product line includes a common PC-NET software programming package and PC-NET graphical control software, as well as remote diagnostics via ipGateway™ Internet portal. The Mx-5000 is fully backward-compatible with the Mx-4000 series and supports all of the latest analogue addressable field devices.

For more information go to www.advel.co.uk

Big Solution for Small Installations

BOSCH SECURITY SYSTEMS' Fire Panel 1200 Series for smaller installations offers fire protection in the one and two-loop segments, and is said to combine flexibility and ease-of-use with the reliability of the company's Modular Fire Panel Series.

The 1200 Series panel is operated via an easy-to-use touch screen featuring a large LCD display and an intuitive user interface with a clear menu structure. In

addition, the panel offers various functions including the display of extensive diagnostic information. Based on the LSN (Local Security Network) bus system, it offers a high level of system stability, and supports the full range of proven LSN peripheral components. It also provides synergies with the existing Modular Fire Panel family in relation to specification, configuration, maintenance and logistics.

The 1200 Series also offers an extensive choice of rugged, encapsulated modules that can be hot swapped, which means that it is possible to replace modules in a running system. The standard deployment of the 1200 Series panel is one loop, although it can be easily extended to two loops with an additional module. Up to three remote keypads can be connected to the 1200 Series panel, plus it is also possible to connect the panel to a fire monitoring or building management system.

For more information go to www.boschsecurity.com

Large Project Panel Enhanced

The latest version of the Modular Fire Panel 5000 Series from BOSCH SECURITY SYSTEMS includes enhanced features that are aimed at greatly simplifying operation of the system, as well as making installation and networking much easier.

The Modular Fire Panel 5000 Series panel now operates with a new serial interface for directly connecting the Bosch Plena Public Address and Voice Alarm system without any additional contact interfaces. This reduces installation and hardware costs, particularly for projects with numerous evacuation zones. Fire panel networks can be easily tied together with the EVAC system that enables intelligent operation of the voice evacuation system via the fire panel.

The modules are extremely rugged, with components protected by encapsulated housings to avoid damage from touching or static discharge. Regardless of the size of a building or site, only a few standard modules are required from which the customer can easily construct a tailor-made system. The system can be extended from one loop to up to 32 loops with more than 4,000 elements. A "hot plug" feature allows modules to be plugged in or removed for expansions or modifications while the panel is in operation.

For more information go to www.boschsecurity.com

Networkable Fire Panels

All six of C-TEC's XFP networkable one and two-loop analogue addressable fire alarm panels have been tested for functionality and performance, comply with EN54 Parts 2 and 4 and are third-party approved by LPCB (Loss Prevention Certification Board).

The XFP range is targeted at office blocks, shopping complexes and big industrial sites as well as smaller, stand-alone applications and, the company says, offers high performance at a very competitive price. It is available as a single-loop 16-zone panel in a plastic enclosure, or a robust one or two-loop 32-zone metal panel, offering full compatibility with Hochiki's ESP and Apollo's XP95, Discovery and Xplorer protocols. Features include two independently programmable conventional sounder circuits and the ability to interconnect up to eight XFP main panels onto a two-wire RS485 network. The XFP is also fully compatible with C-TEC's new Hush Button fire alarm solution for Houses of Multiple Occupation.

For more information go to www.c-tec.co.uk

Conventional Panel Offering

CFP panel

Three distinct ranges of conventional fire alarm panel are currently available from C-TEC: the CFP two to eight-zone EN54-2/4 fire panel; the MFP four to 28-zone BS5839-4 fire panel; and the FP one to 14-zone BS5839-4 fire panel.

The CFP EN54 panel comes in three versions – standard, economy and LPCB-approved and is supplied in a flush or surface-mountable plastic enclosure. All come with two, four of eight detection circuits and feature four conventional sounder circuits, two inputs (class change and alert) and four outputs (fire one, fire two, fault and reset). Depending on the model purchased, an array of engineering functions is available including: selectable zone delays; coincidence; non-latching zones; and comprehensive fault diagnostics facilities. The CFP is fully compliant with EN54 parts 2 & 4, the European standard for fire alarm control and indicating equipment.

The MFP four to 28-zone fire panel was designed to fill what C-Tec

MFP panel

perceived as the gap between low cost, low specification fire panels and higher priced, higher specification equipment. Expandable from four to 28 zones in four zone steps, the MFP's four sounder circuits, head-out fault indication and two on-board fire relays, plus its compatibility with a wide range of expansion boards makes it one of the most sophisticated BS5839-4 compliant fire panels available. It offers a wide range of engineer functions including: one-man detector test; sounder walk test; sounder isolate; sounder delay; and auxiliary isolate.

The FP one to 14-zone panel has been protecting people and property for almost two decades. Like the MFP, it is supplied in a robust metal enclosure with a lift-off lid and heavy-duty base connections to help promote an easy first fix and straightforward maintenance. The FP's broad compatibility with virtually all known conventional smoke and heat detector ranges and its ability to interpret a short circuit in any zone or zones as a fire or fault make it particularly useful for retro-installations. Optional head out monitoring units are also available for systems requiring compliance with BS5839-1 (1988).

FP panel

For more information go to www.c-tec.co.uk

Upgrade Improves Commissioning Process

Nano is the latest fire detection control panel from GENT BY HONEYWELL. This single-loop analogue addressable panel is aimed at small sites that require improved fire sensing and evacuation options, and offers a simple cause-and-effect, which can be configured by a simple and easy to use PC commissioning tool.

Incorporating an intuitive user interface, Nano manages up to 127 devices on the loop and offers end users a smaller system that benefits from the support of Vigilon's loop technology that supports a range of devices: S-Quad sensors; interfaces; beams; manual call points; and S-Cubed sounders.

Gent by Honeywell launched a system upgrade in April 2010. An improved commissioning process allows changes or the addition of devices to be managed easily and quickly, while offline commissioning enables the system to be configured before the commissioning engineer attends the site.

For more information go to www.gent.co.uk

Mid-range Panel is EN54 Compliant

Vigilon Compact is a one to two-loop panel designed for small-to-medium systems and uses VIGILON technology, offering the capability of networking with other Compact or Vigilon panels on the same centrally managed system.

Sixty percent smaller than a standard Vigilon panel, Compact incorporates an intuitive user interface allowing the user to determine quickly the position and nature of an emergency. This can be enhanced by the use of the WINMAG PC-based graphical management application or a loop-based mimic panel. Repeat panels relay all information provided from the main control panel and provide main control functions.

The Gent by Honeywell analogue addressable panel fully complies with EN54: Parts 2 & 4 and can accommodate up to 200 devices on a loop, supporting a range of devices: S-Quad sensors; interfaces; beams; manual call points; and S-Cubed sounders.

A recent addition to the Vigilon range is a newly enhanced mains powered interface, designed to comply with BS 7273, a standard concerning the critical signal path between fire detection and alarm systems and release mechanisms for fire doors. Controlled by the panel, the new loop-based interface will maintain the integrity of fire compartments, even with a fault on the system.

For more information go to www.gent.co.uk

Panel Offers Ease of Programming

The VIGILON analogue addressable fire detection and alarm system from Gent by Honeywell is targeted at medium-to-large buildings and is promoted as being simple to install, configure and use. It offers a range of control panels that can be installed either as four or six-loop stand alone panels, or as part of a multi-panel network, easily programmable as one system. This seamless network can contain up to 200 panels, with the capability to add new buildings or extensions after installation.

In common with Nano and Vigilon Compact, the Vigilon's loop supports a range of devices, and each loop is capable of supporting up to 200 devices with a maximum of 512 detection devices on each panel.

Available with 24 or 72-hour standby facilities, its flexible loop architecture makes it suitable for any type of building. The Vigilon architecture offers soft addressing that can minimise installation time and remove potential for manual addressing errors. A specifiable option is SAFE (Soft Addressed Fireware Encoded) that makes management simpler post installation and commissioning.

For more information go to www.gent.co.uk

Conventional Panel Offers Eight-zone Coverage

The option from Gent by Honeywell for small building premises requiring coverage for up to eight zones is the Xenex panel that is compliant with EN54 part 2 & 4 and contains integral power supply and battery support to drive up to eight alarm sounder circuits, two auxiliary relay contacts, a zone disablement facility and a one-man test and commissioning feature.

Designed to achieve ease to installation, use and maintenance, the system supports up to eight sounder circuits, allowing fire detection and sounder circuits to be connected in one four-core cable. Its compatibility with a range of low current devices also means the system can support greater numbers added to the loop if required. The Xenex panel has a 72 hour standby provision, guaranteeing a functioning system for up to 72 hours following a mains power fault.

For more information go to www.gent.co.uk

Analogue and Conventional Options

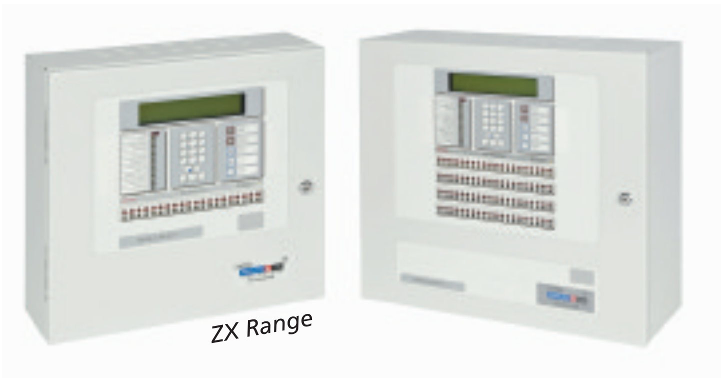
The Syncro AS single or two-loop analogue addressable fire control panel from KENTEC supports open protocol communications, including Apollo, Argus Vega and Hochiki, and uses microprocessor-based electronics to provide what the company describes as a flexible control system with high reliability and integrity. It is aimed at small to medium sized fire detection systems.

Utilising the two-wire technology of Apollo's AlarmSense®, Kentec's new fast-setup Sigma CP-A two, four and eight-zone fire alarm control and indicating panels permit rapid system configuration of compatible devices. These include smoke and heat detectors, call points, base sounders, base sounder/beacons and relay units, which can be wired to the same pair of cables, for common, zonal or two-stage alarm using simple menu options on the panel.

For more information go to www.kentec.co.uk

Panels for all Building Types

DX Range



ZX Range

The open protocol fire alarm control panels from MORLEY-IAS support five industry-leading detection device protocols. The current offering includes Horizon, Dimension and ZX panels.

The Horizon non-addressable control panel is designed for small shop or warehouse units, nursery schools and doctors' surgeries, while the Dimension analogue addressable control panels provide what is described as an "out of the box, onto the wall" solution for such applications as larger shops, offices and banks.

Horizon Panel

The Morley-IAS ZX range of one, two and five-loop modular, intelligent fire alarm control panels is suitable for protecting all types of property. The panels' power and flexibility is said to make them capable of even the most complex installation or multi-site network. With up to 99 panels on a single network, and a choice of networking configurations, the ZX Series is suited to a broad range of applications, from schools and universities to shopping centres, cinemas, hospitals and airports.

For more information go to www.morleyias.com

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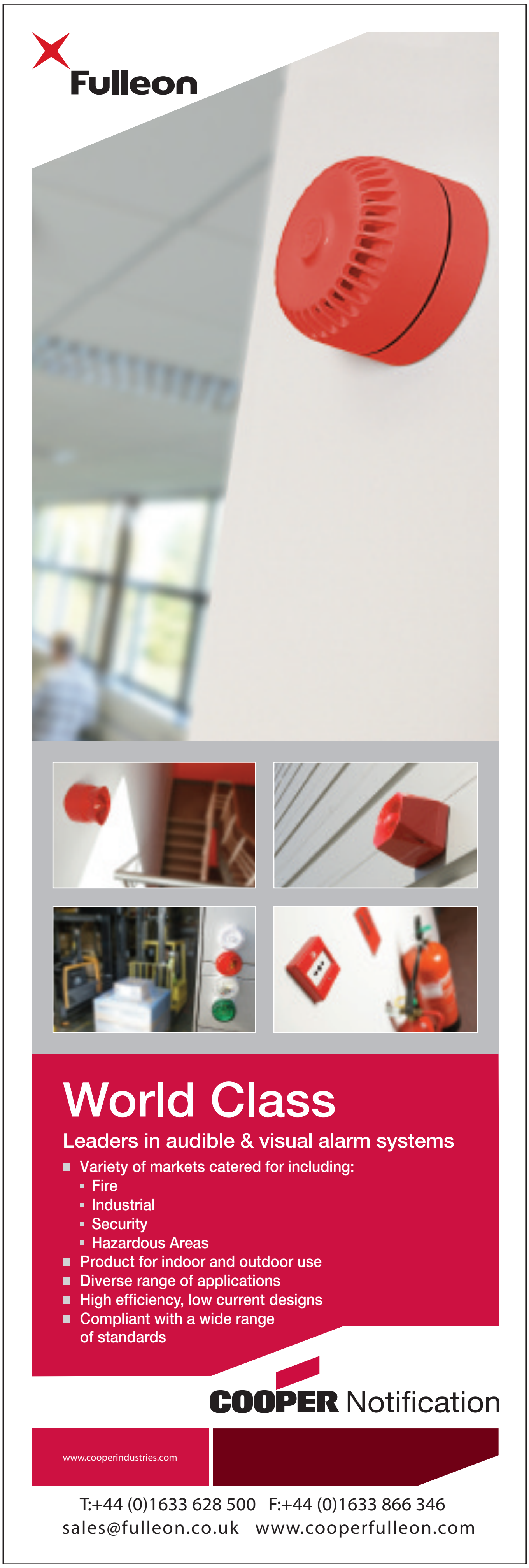
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The Growing Role Of Voice In Fire Safety

Research shows that more people respond to spoken message alarms than either alarm bells or text messages.

By Rick Love

Notifier by Honeywell

Some years ago, a survey found that, in the event of a fire, only 13 percent of people responded to a bell warning: by contrast, 45 percent reacted to a written text message display and some 75 percent to a spoken message.

The results of this earlier study may not perhaps be very surprising. However, as the latest research undertaken on behalf of Notifier has confirmed, the overwhelming majority of the general public and industry specialists alike believe that over the past five years the world around us has since become even noisier.

And this is especially worrying, as the new research also identified that fewer than ten per-cent of the general public always think about how to get out of a building, whether or not they use it regularly. In the event of a fire alarm, a common response is first to assume that it is a false alarm and then "follow other people around me" rather than adhere to the safety instructions.

Bells and sounders can only provide a warning that there is some kind of emergency, but it is not always obvious what kind of emergency it is. By contrast, a clear spoken message and a VA/PA system provide the information needed to direct the public or employees away from danger and out of the building in the most efficient way possible.

Fighting to be heard

The recent surveys, which enabled a comparison of the views of fire safety professionals attending a Construction CPD seminar with those of the general public, found some interesting similarities in how each group would react in an emergency situation. The overwhelming majority of the public (86 percent) and industry specialists (74 percent) believe that the world is a noisier place than five years ago.

Yet this is taking some time to feed through to expectations regarding the provision of appropriate

fire safety messaging. In the event of a fire alarm, 89 percent of the public, and 77 percent of industry experts expect to hear a bell or other audible sounder, with only 12 percent and 20 percent respectively anticipating a standard or more detailed kind of loudspeaker announcement. Yet well over half (57 percent) of the public are already certain that they would respond more quickly to a voice alarm in evacuating a building, with a further 32 percent as yet not sure how they would react.

This lack of directional information is critical, as only six percent of the public always think about how to get out a building in an emergency in which they are regular occupants and only three percent in those buildings where they are occasional visitors. Equally worryingly, two-thirds rarely, if at all, think about evacuation procedures as regular occupants. This rises to almost 90 percent in buildings they use infrequently.

Although professionally more aware of the risks, more than 40 per cent of industry experts also rarely or never think about how to get out of any building, whether or not they use such facilities regularly.

In the event of a fire alarm, 40 percent of the public (and 26 percent of industry experts) would instinctively follow the people around them and only 29 percent would use the nearest exit. In the case of both the public and industry experts, more than one quarter (26 percent) would assume it is a false alarm until advised otherwise.

As a result, it has become more important than ever to ensure that staff, residents and visitors alike are able to respond quickly and correctly to a fire warning. In response, sophisticated and intuitive voice alarm systems have evolved to form a key part of comprehensive fire detection and alarm systems, designed for complex environments in which individuals will respond to warnings in different ways.

These integrated solutions benefit both building users and firefighters called to deal with the emergency, as they are able easily to take over the Voice Alarm/Public Address (VA/PA) system to broadcast individualised messages, in order to ensure a rapid yet controlled evacuation from any part of the premises at risk.

An integrated response

In the 1980s, early voice alarm systems in the UK and Europe were typically message generators bolted onto an existing PA system, with a simple trigger mechanism from the fire alarm to play a pre-set message over the loudspeakers.

However, over the past two decades its capability has been extended, replacing earlier sounder circuits with the development of an integrated and monitored VA/PA approach. This enables messaging such as paging, information announcements, advertisements and the provision of background music in public access areas such as shopping centres, railway stations and sports stadia. It maximises the value of their investment and provides customers and visitors with a more comprehensive service and in the safest possible environment.

Technical developments, especially in the area of digital signal processing, have made it much easier to manage VA/PA systems. PC-controlled site-configurable routing and set-ups have replaced the costly and high-maintenance hard wiring and relays previously required and the resulting audio quality is also much improved.

Today's advanced VA/PA solutions are much more cost-effective in that they require fewer amplifiers. They are much easier for operators to use, as the microphone stations use the latest LCD-type screen technology to direct and control announcements. For larger implementations, the best network systems can carry up to 32 audio channels on a fibre channel interface up to two kilometres between stations. This means that a single integrated VA/PA system managing multiple channels of music, general announcements and fire safety information makes it easy to manage large multi-purpose premises and public arenas.

Continuous development

With the emergence of voice over IP (VoIP) networks, work is also underway to enhance the

ability to link multiple buildings together across large sites in an integrated, cost effective and easy-to-use VA/PA solution. This forms part of a broader drive towards greater networkability, designed to improve system implementation and maintenance and ensure greater security in linking locations with a single integrated solution.

However, an area of historic concern that is receiving much attention is that of intelligibility, as there is no point in having a VA/PA system in which messages being transmitted cannot be understood. The reason for this problem is that the sound that is sent from a traditional speaker is essentially undirected. As a result, it bounces off the floor, walls and is reflected off other surfaces, each of which reaches the ear at slightly different times, so leading to aural confusion.

anticipated to come into effect in the next two to three years. As with the UK's Equality Act, October 2010, the driver here is to protect those who cannot hear a sounder or alarm or who work in areas where there are significant ambient noise levels such as workshops or manufacturing environments.

In line with the current US standards – which, for example, require lights in a hotel environment to be bright enough to wake people from a light sleep – the impending regulation will determine how bright visual devices should be.This presents a major technical challenge in getting sufficient power to the device and may promote a change of thinking. Instead of looking simply at improvements to the light or sound-based warning device, with improvements in wireless technology, an alternative may lie in the direction of personal alarm devices such as pager or vibrator solutions.

Other compliance demands

Though awareness as to the importance of voice is growing, the uptake of such products is still relatively slow. VA/PA solutions are principally used only as directed by the fire authority, or where the provision of a PA system to meet other needs makes the incremental cost significantly lower than where a simple upgrade from sounders is being considered.

Having said that, though budgets may be under extreme pressure, compliance demands have increased in requiring safe and environmentally-friendly public venues. As a result, almost without exception today in buildings requiring phased evacuation, any fire safety solution is likely to include an element of voice as part of a comprehensive detection and response strategy.

And, as the Notifier survey confirmed, most of the public are certain that they would respond more quickly to a voice alarm in evacuating a building, so endorsing the effectiveness of this approach to enabling faster, safer evacuation.

With the emergence of voice over IP (VoIP) networks, work is also underway to enhance the ability to link multiple buildings together across large sites in an integrated, cost effective and easy-to-use VA/PA solution.

Speaker technology has remained essentially unchanged for many decades. However, "intelligent" speakers are now available to meet specialist applications such as large facilities with acoustic problems, including noisy railway stations or swimming pools. The intelligent line array speaker, for example, is a tall column which splits the sound beam in three different lobes. From a single speaker therefore, it has become possible to direct the sound where required with real precision. Such solutions are also cost-effective. For though an individual line array speaker is more expensive, fewer are required within an installation due to their more targeted performance. This also impacts positively on the cost of installation and on-going maintenance.

Regulatory changes

One area of fire safety regulation likely to be subject to change in the near future is that of visual alarm devices under EN54 Part 23,

On a day-to-day basis, the latest VA/PA solutions operate just like an advanced PA system. Individual microphones with touch screen displays allow the broadcasting of background music and announcements. However, in an emergency the system will react, delivering spoken messages appropriate to the event and the occupants of each location within the premises. For situations that demand more specific responses, an emergency microphone can be controlled simply and easily.

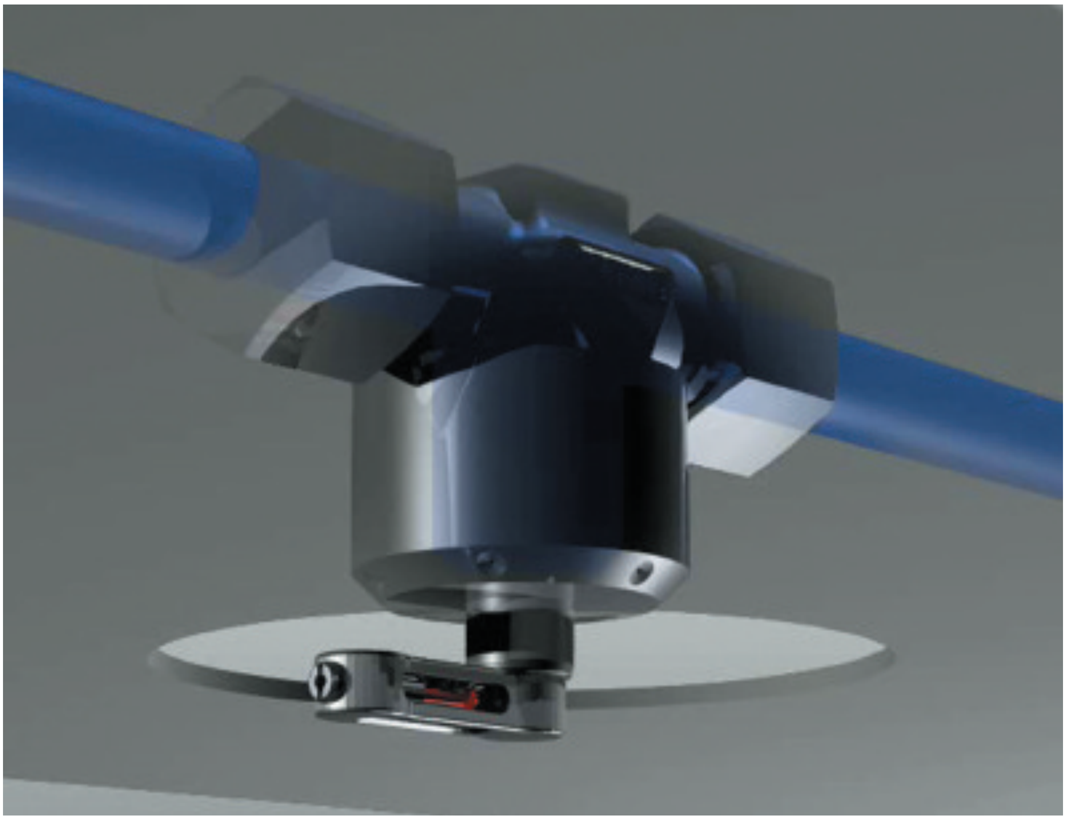
The life safety industry continues to place a high development priority on the addition of voice to its armoury of fire detection and response solutions. As a result, from a technology viewpoint this is no longer a mysterious "dark art", as cost-effective VA/PA solutions are now available which enhance the user experience, in providing a wide range of safety and other information messages. IFP

Rick Love is Senior Product Manager, Notifier by Honeywell

For more information go to www.notifier.com

Watermist Systems B

HI-FOG pop-out sprinkler



By Graham Collins

Watermist installations are growing apace. However, when we talk about land-based system we inevitably refer to systems that are protecting buildings. So here we look at two other land-based applications – rail rolling stock and tunnels, for which at least two of the leading suppliers have recently introduced new solutions.

Rail safety is attracting considerable attention, as is tunnel safety. Both seem to be the subject of a number of recent conferences and seminars. So perhaps now is a good time to take a closer look at the latest offerings from the leading watermist specialists in these particular sectors.

As far as rail safety is concerned, there are two fire risks that need to be addressed. The first is the protection of engines, motors, generators, control systems and under-carriage areas; the other is the protection of passenger carriages that, due to the number of passengers being carried, represents the greater life threatening challenge. Both make considerable demands in terms of the fire, emergency response and evacuation strategies, having to take into account the frequent lack of access to the location of the emergency, the escape challenges faced by passengers, and the possible time delay before the emergency services can intervene to prevent a major catastrophe.

Rail protection systems

Two of the leading watermist companies have recently devised solutions specifically for these applications – Finnish company, Marrioff and Austrian watermist specialist, Aquasys Technik.

At the recent Innotrans exhibition in Berlin, Marioff launched and demonstrated its new HI-FOG® high-pressure water mist system pop-out sprinklers for rolling stock. They feature horizontal heat bulbs that minimise the height of the sprinkler, making them easy to install and unobtrusive. Additionally, the sprinkler is concealed under a protective plate that cuts the risk of vandalism.

After the new Marioff system is activated, heat-sensitive sprinklers are designed to react only near the actual fire, which helps reduce the discharge area and increase pressure on the sprinklers, improving the firefighting performance. This smaller discharge area also results in better visibility and less water damage, and space and weight demands are minimised because less water is required.

According to Marioff, one of the key drivers behind this development is the Italian legislation Decreto Gallerie, which requires active fire protection for all new rolling stock after April 2011. Existing rolling stock must be retro-fitted to comply with the legislation by April 2019. Marioff's Italy-based Key Account Manager, Rolling Stock, Francesco Capuzzi, believes that the call for watermist fire protection in rolling stock is growing

For more information go to www.marioff.com or www.aquasys.at

oost Traveller Safety

Rome station

steadily and he expects current demand to double within the next five years.

The Aquasys railway fire protection system sets out to fulfil a number of key objectives alongside those of predictable reliability, speed and efficiency. These are to provide a solution that is completely harmless to rolling stock passengers and firefighters, and have the lowest possible weight while taking up the minimum amount of space. The low water demand of these systems means that they can be easily installed undercarriage, on the roof and even in the intermediate ceilings of passenger compartments.

Tunnel safety solution

Aquasys has also developed an effective watermist system for firefighting in tunnels. Upon detection of a fire, watermist is produced in the affected section of the tunnel. The small water droplets evaporate, which creates an enormous cooling effect. Additionally, the watermist acts like a countless number of reflectors that drastically minimise heat flux radiation. As it uses pure water, it is harmless for tunnel occupants and firefighters alike and the environment, so can be activated throughout the evacuation stage of the emergency.

The system sets out to achieve three key objectives: prevent the fire from spreading to other vehicles; enable the fire and rescue service to safely access the scene of the fire; and protect the tunnel structure.

The structure of a tunnel leads to a rapid increase in temperature and the production of large volumes of smoke that cannot escape. These challenges can be difficult to overcome using conventional methods; increasing the risk to travellers trapped in the tunnel, and increasing the threat to vehicles and the very structure of the tunnel itself. These challenges have to be quickly overcome.

The Aquasys solution is what the company calls Rapid Fire Control (RFC), whereby specially formulated water forms a mist that contains the fire by extracting energy and displacing oxygen in the shortest possible time. Cleansing of the smoke gases aids in the preservation of the oxygen content in the tunnel.

The first road tunnel with an Aquasys system was the 800-metre Mona Lisa Tunnel in Austria; a two-lane road tunnel with bi-directional traffic. Other tunnel project to use the system included the 5300-metre Felbertauerntunnel in the Alps. This bi-directional tunnel is constructed with an intermediate ceiling above the traffic lanes that accommodates exhaust and fresh air ducts. The fresh air duct is also used as an escape route in case of an incident.

In the Netherlands, two new road tunnels have been recently equipped with Aquasys watermist firefighting systems. Both, the 2000-metre Roertunnel in Roermond – currently the longest land tunnel for road traffic in the Netherlands – and the 400-metre Swalmen tunnel are constructed with two bores, each having two lanes, operating uni-directional traffic. In both of these projects a particular focus was placed on protecting the building structure, so aqueous foam forming additives (AFFA) were added to the water to enhance the watermist system's effectiveness suppressing incidents that involve combustible liquids. IFP

Clouds In The Fore

By Kurt Werner

Environmental Affairs Manager, 3M

For users of HFC-based fire protection systems, the future is anything but clear.

There is a lot of confusion within the fire protection industry about the ultimate impact of global policy, legislative and regulatory initiatives on HFCs [hydrofluorocarbons]. Although it is quite clear there will be restrictions on, or added costs for, the continued use of HFCs in fire protection, the exact nature of the restrictions or the magnitude of the cost increases are difficult to predict.

Compared with the phase-out of ozone-depleting substances in the 1990s under the Montreal Protocol, predicting the fate of HFCs is proving to be more complex. For one thing, it appears that not all HFC markets will be affected in the same way. Substantial applications within the air conditioning, refrigeration and foam blowing sectors have no viable alternatives at this time, while others, such as fire protection, do. Either through market dynamics governed by the proposed HFC phase-down under the Montreal Protocol, in the US via Congress, or through direct regulatory measures, the fate of HFCs in fire protection is unclear. This is creating an entirely uncertain timetable for the designers, manufacturers, installers and owners of fire protection systems.

If you are using a suppression agent such as 3M™ Novec™ 1230 Fire Protection Fluid in your fixed system, you have already made a sustainable choice, and the phase-down of HFCs will not directly affect you. If not, let us take a look at some of the issues likely to impact the fire protection industry in the years to come.

Environmental concerns are at the heart of the matter, just like they were 16 years ago when HFCs were accepted as an alternative to halons and other ozone-depleting substances. Today, the widespread and growing use of HFCs as ozone depleting substance replacements, coupled with their high global warming potentials, has them targeted as a potentially significant future contributor to global warming and climate change. HFC emissions in 2050 are projected to be between nine and 19 percent of projected global CO_2 emissions in business-as-usual scenarios.

Concerns are also growing about the future impact of emissions from banked HFCs stored in equipment such as fire protection systems. It is important to note that the HFCs used as fire suppressants have higher global warming potentials than the HFCs used in other industries.

The impact of proposed climate- protection legislation on the fire protection industry is a topic of much debate. The U.S. House of Representatives last year passed the American Clean Energy and Security Act of 2009. This legislation included HFC provisions that would, through allocation and auction, phase-down the production and import of HFCs by 85 percent between 2010 and 2032. A concurrent proposal by the US, Canada, and Mexico would add HFCs to the Montreal Protocol and phase-down their production internationally

cast

by 85 percent by 2033 in developed countries and by 2043 in developing nations.

This phase-down will, over time, lead to substantially higher costs for HFCs. One concern is that the mechanisms through which HFC production allowances would be auctioned may be disproportionately unfavourable to HFCs sold into fire protection. As already noted, these HFCs have higher global worming potentials than HFCs sold into other sectors, and ultra-low global warming potential replacements are already available – unlike in many other HFC sectors. In effect, this disparity would add a higher tax at the national level on the production of HFCs for fire protection.

It is also likely that HFC auction costs will be driven far off the legislated minimums before the large commodity markets move to the substitutes. And, as the market is intended to encourage the most effective reductions to occur first, it is possible that the fire protection market, where substitution costs are far more modest, may be the first to move. It is important to consider the possibility that the HFC phase-down supported by HFC producers may turn their commodity HFC markets back into specialty markets, but this may not be favourable for HFCs sold into fire protection.

Another potential path to HFC regulation was revealed in May, 2010 when the US's Environmental Protection Agency received a petition to selectively remove an HFC from the list of acceptable substitutes under its Significant New Alternatives Policy Program (SNAP), based on the availability of low global worming potential substitutes. This perhaps is a more expedient route to the regulation of HFCs, and may have a dramatic impact on HFCs sold into the fire protection sector where alternatives are also readily available for the vast majority of applications.

The widespread and growing use of HFCs as ozone depleting substance replacements, coupled with their high global warming potentials, has them targeted as a potentially significant future contributor to global warming and climate change.

Not everyone agrees, however. Some suggest that market mechanisms might work in favour of HFCs produced for fire protection. They argue that low global worming potential materials will enter the commodity markets and replace hydrofluorocarbon refrigerants, which may free up lower cost production allowances for producing HFC fire suppressants.

But, arguably, the most important considerations remain the availability of HFC substitutes in large commodity sectors – relative to the proposed phase-down schedule – and their costs. Substitutes in fire protection come at a very modest premium to HFCs and already have a substantial market share. Alternatives currently being developed for other HFC sectors are likely to enter the market at costs measured in multiples rather than percentages.

As the old saying goes, the only certainty is uncertainty, especially given that today's fire protection systems are intended to last well into a most uncertain future. The good news is that available alternatives to HFCs, such as Novec 1230, offer a favourable environmental profile and much greater sustainability. And choosing a sustainable alternative today could help make your future a lot less cloudy. IFP

Kurt Werner is 3M Environmental Affairs Manager.

For further information go to www.3m.com

Deluge Protection For Spain's Vielha Tunnel

The Vielha Tunnel was once identified by the European Commission as one of Europe's most unsafe tunnels. Today, it is the first tunnel in Spain to be protected by a deluge fire protection system.

By Pedro Valcárcel

Fire Protection Market Manager, Victaulic

The five-kilometre Vielha Tunnel in the municipality of Vielha e Mijaran links France to Catalonia and was once identified by the European Commission as one of Europe's most unsafe tunnels. In 2002 the Spanish Government decided to make a major investment in safety with the roll-out of a €300 million improvement plan; a project that involved the creation of a totally new tunnel close to the original site and the implementation of a new deluge fire safety system – the first of its kind in Spain.

The main advantages of deluge systems are their ability to rapidly lower temperatures, to cut the advance of fires, and to protect structures against potential collapse. So they are used principally in locations where the spread of fire can be very rapid, or where the consequences of fires can be devastating. This includes airport hangars, refineries, chemical plants and armaments factories … and tunnels.

In Japan, deluge systems have been used for the past four decades, while in the United States there are six tunnels equipped with such systems. European installations include the Mona Lisa Tunnel in Austria – a deluge system using water-mist – while in Germany, France and Italy feasibility studies are being undertaken.

Safety first

Since the completion of the installation of the deluge system, the Vielha tunnel received a EuroTAP ++ rating (excellent) and has been assessed as being an example of how a deluge system installation should be carried out.

Now one of the safest tunnels in the world, it features evacuation galleries every 400 metres, safety recesses every 200 metres, semi-transversal ventilation, and a fire prevention network for water along the tunnel, with hydrants and a deluge system with spray nozzles. Emergency beacons, Closed Circuit Television (CCTV), smoke detection and automatic incident detection were also implemented. During construction, to minimise the use of welding, and reduce associated risks from toxic fumes and fire hazards, a grooved mechanical piping system was used.

The high altitude tunnel posed a number of unusual challenges – not least of which was its corrosive environment. Damage was reduced by using stainless steel for exposed piping and the burying of ductile iron pipe.

The Victaulic FireLock® fire protection system was selected because it delivered a reduction in installation time of over 70 percent. Victaulic stain-

less steel rigid and flexible couplings were used for sections exposed to the fierce elements, and all sprinkler system joints used Victaulic grooved mechanical couplings that were made in accordance with the NFPA 13.

Deluge in action

The Vielha fire extinguishing system feeds nozzles that are over 100 metres from the municipal reservoirs. There are three pumps – two electrical and one diesel – each capable of supplying 50 percent of the total requirement, and pressure maintenance is ensured through a jockey pump.

There is a height difference of more than 200 metres between the north and south entrances so, to prevent pressure exceeding 16 bars, there are a series of pressure reduction stations. Deluge valves also function as pressure reducing turn valves, adjusted to around five bars, while hydrants and fire hose cabinets also act as valve pressure regulators.

The Vielha system is equipped with a detection line and an extinction line. This uses nozzles and is kept empty; deluge valves are opened only by manual activation. When the deluge valves are opened, the water discharges from all of the nozzles. Systems can be activated locally at a manual pull station, or from the control centre. An electrically-activated deluge valve with a pressure control is used, and there is a deluge station positioned every 50 metres so, in total, the project called for the installation of more than 100 independent systems.

A range of triple-nozzles is fitted every five metres in the tunnel to protect against fire, and the pressure is maintained at five bars. The ventilation system is semi-transversal with vents on the ceiling, the main objectives being to maintain air quality and guarantee control of smoke in the event of a fire. IFP

Pedro Valcárcel is Fire Protection Market Manager for Victaulic in Spain

For more information go to www.victaulic.com

Smoke Screen: The Smoke

By James Lane

Principal Fire Consultant, Hilson Moran

Fire safety and compliance with statutory regulations have a major influence on building form and design. Although the subject is universally referred to as fire safety, should it really be considered as fire and smoke safety?

For millennia, the human race has used the controlled production of smoke from the combustion of known fuels to its advantage; from a rudimentary signalling system to a means of preserving food or even fumigating our living space.

But when the production of smoke is accidental and the amount and composition is not controlled, smoke very quickly becomes one of the greatest hazards in the built environment. We have probably all experienced an unfavourable wind direction blowing bonfire smoke at us; a cough or two and maybe some streaming eyes. So when we hear about a casualty suffering from smoke inhalation it never strikes us as particularly serious. In the open air, our bonfire smoke will be relatively cool. Smoke that is produced by an intense fire within a building could be extremely hot and contain toxic gases causing burns to the skin and possibly to the pulmonary system. According to the 2007 fire statistic for the UK:

- 64 percent of all fire fatalities involved some contribution from the effects of smoke.
- 44 percent of all fire fatalities were attributed to the effects of smoke alone.
- 29 percent of non-fatal fire injuries were from the effects of smoke.
- 16 percent of non-fatal fire injuries were from burns (which include combined smoke and burns injuries).

If we consider that 44 percent of non-fatal injuries were for people admitted to hospital for a check-up but with no serious injury, then it becomes apparent that smoke is responsible for a majority of deaths and injuries in fires, more than the direct effects of burns from the fire itself.

The underlying concept for fire engineering is to design the means of escape so that occupants will be able to escape to a place of safety before untenable conditions are reached. This can be expressed as RSET<ASET, where:

RSET = Required Safe Egress Time (time taken to reach a safe place).
ASET = Available Safe Egress Time (time taken for conditions to become untenable).

The statistics on fire deaths and injuries indicate that it is the presence of smoke that will herald the onset of untenable conditions. So how might we avoid exposure to fire smoke and extend the ASET value beyond the RSET?

Know your enemy

Before we can effectively manage smoke, we should understand first what it is and what governs its behaviour. Smoke is produced by the chemical breakdown of a fuel. Pyrolysis releases chemicals into the flame where rapid oxidation liberates:

- Waste gases (often toxic and noxious, causing irritation to the skin, eyes, nose and throat and containing cyanide and oxides of carbon inducing asphyxiation).
- Solid particles (in the form of soot, which is mainly unburned fuel and pyrolised carbon that has not been fully oxidised).
- Liquids (significantly water, but may include condensed forms of the gases above).

And, of course, potentially large quantities of heat. In fact, approximately two-thirds of the heat produced in a fire is transferred by convection into the smoke plume.

In 2007 in the UK, 64 percent of all fire fatalities involved some contribution from the effects of smoke, while 44 percent of all fire fatalities were attributed to the effects of smoke alone.

The heat contained in the smoke gives the plume buoyancy over the surrounding air, which is the driving force behind the spread of smoke around the building. As the smoke plume rises, cooler air is entrained, which leads to a dilution of the smoke, an increase in the volume produced and a decrease in temperature and buoyancy. If the smoke encounters a feature that increases this mixing then the effects of the dilution are increased. The most significant of these is generally when a flowing layer of smoke meets a void edge (a balcony or interface with an atrium) where the surface area of the plume is increased and a very general rule-of-thumb is that the rate of air entrainment will be approximately doubled.

There are various tools used to understand, or better still predict, the behaviour of smoke and its properties. A relatively simple method is the application of zone model equations. Empirical formulae, developed from plume theory, which give a reasonable approximation of the smoke

Real Impact Of

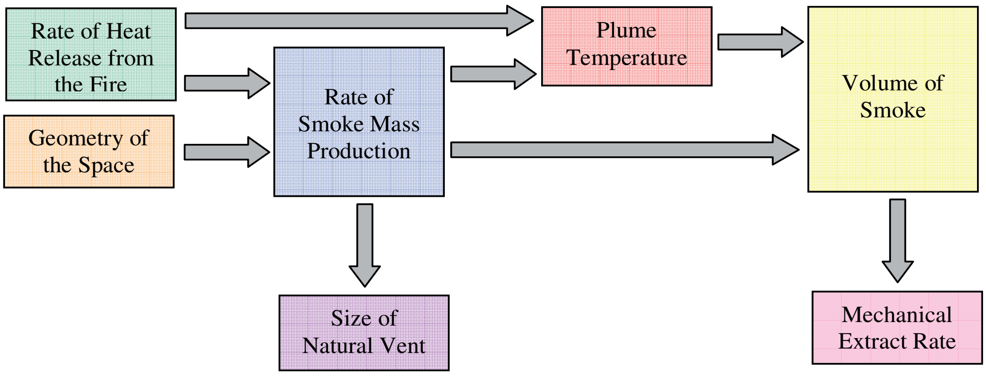


Figure 1

layer properties and separating the space under investigation into two zones: the smoke layer and the clear layer.

Related to the size of the fire, plume and smoke layer temperature, smoke density (visibility) and the volume of smoke produced can be calculated for varying heights. But, where a more accurate vision of the likely conditions is required a more sophisticated approach is needed. This may be the case where a complex arrangement is being considered or where greater detail is called for at various time steps throughout the scenario being modelled. For this we might enter the world of Computational Fluid Dynamics (CFD).

This technique takes the zone model above and divides the volume of the space into a series of discrete parcels or cells. Each of the cells is given a set of conditions that relate to various environmental aspects and the relationship of changes in these conditions. Equations that govern the related effects of all these conditions and how each is influenced by the other are then applied to every cell and minute changes recorded over small time steps. This gives a high resolution to the output and detailed images of the predicted flow of heat and smoke density throughout the compartment.

Taming the dragon

The need to deal with smoke will depend upon what is being achieved. In the UK, where a building is designed in accordance with the guidance, there will generally be no requirement to provide a fully engineered smoke control system. The time to reach a place of safety is assumed to be within acceptable limits.

In which case smoke ventilation may be necessary for basements, car parks, fire fighting shafts, certain atria or tall buildings (especially in London). However, this will be governed by standard provisions as a minimum vent area or air change rate using mechanical extract, and are largely related to firefighting operations.

Where the design of means of escape or some other aspect of the fire strategy involves departure from the standard guidance, a fire engineered solution is required. This may involve a more detailed consideration of the movement and effects of smoke. Diversion of the plume from its natural course or exploitation of its natural properties to achieve a particular aim is smoke control.

The equations that have been developed to estimate the required features of a smoke control system may initially look complex and the iterations of calculations needed to resolve the interrelated properties are at times dizzying. But we should remember that the coefficients and universal constants are all subtle adjustments to a reasonably simple process that could be represented by the model shown in figure 1.

The initiating features that govern the principal characteristics of the smoke plume are the size of the fire and the geometry of the space. Fire size is quoted as the rate at which heat is released during combustion. This can be calculated by assuming a fire load density (amount of fuel distributed over unit floor area – kg/m^2 – converted into energy – kJ/m^2) and a fire duration, which gives a burn rate in kJ/s; or kW.

There is data from survey information on typical (70th, 80th and 90th fractile) fire load densities according to building use. Alternatively unit heat release rates may be adopted such as those given in the CIBSE Guide E:

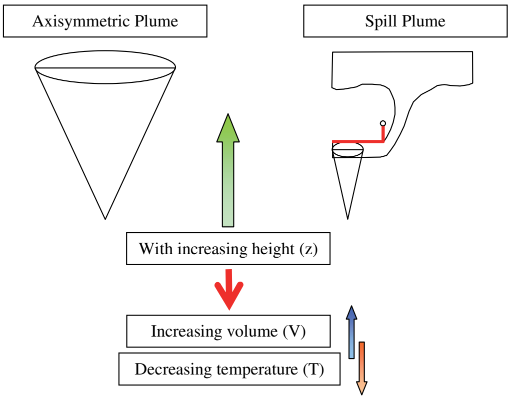
Occupancy	Unit heat release rate (kW/m^2)
Offices	290
Shops	550
Industrial	260
Hotel rooms	249

Where the building is sprinkler protected it is commonly assumed that the fire will increase in heat release rate up until the point when the sprinklers operate, at which point the fire size remains constant. A standard fire size often quoted for sprinkler controlled fires is 5MW or 2.5MW (convective) where fast response heads are installed. However, this relates specifically to retail fires and, while most smoke control system designs will be approved on this basis, the fire design consultant should consider whether this is appropriate or if there are any special circumstances that would result in a higher or, of course, lower heat release rate.

Geometry refers to the physical constraints that shape the smoke plume. Two fundamental parameters are whether it will be an axisymmetric (conical) or spill plume. Conical plumes tend to

produce less smoke volume, but much higher temperature. Whereas a smoke plume that spreads beneath a horizontal surface before "spilling" into the larger void, such as might be the case in an atrium or shopping mall, will produce a higher volume of smoke (approximately twice as much) but at a lower temperature.

The other governing factor is at what height the base of the design smoke layer will be. This is commonly set as a minimum height to achieve the purpose of the smoke control system (e.g. 2.5 metres above escape balcony height or maybe equivalent to the smoke screen downstands).

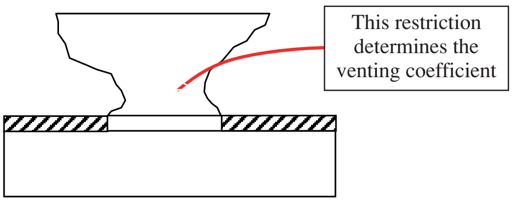


Avoiding the pitfalls

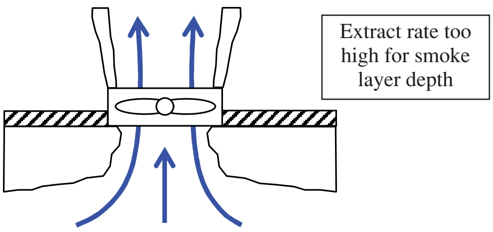
Once the volume and temperature of the smoke plume have been determined it is straightforward to specify the area of the vents required to allow the smoke to escape, or the fan extract rate to remove sufficient volume.

But beware; it is important to bear the following in mind when specifying the requirements to the client:

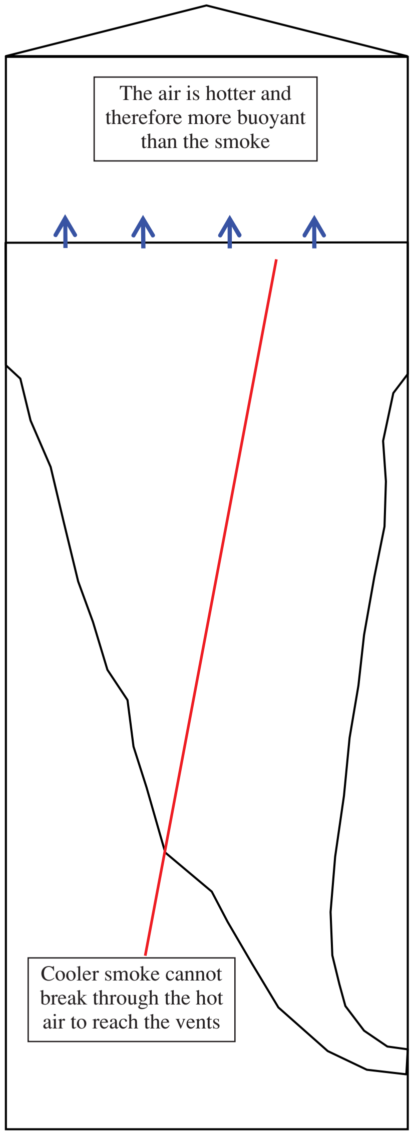
- The calculated vent area will likely be the "aerodynamic area" required to vent sufficient smoke. Vent design will incorporate a coefficient of discharge (a kind of efficiency rating) that could be as low as 0.6. In other words the actual vent size could be almost twice the calculated area.



- There is a maximum critical flow rate for a single mechanical extract point. The value will depend upon the depth of the smoke layer below the extract point. If the critical rate is exceeded this could lead to "plug-holing", which reduces the efficiency of the system. To remedy this more extract points can be introduced.



As mentioned previously, natural smoke venting relies on the buoyancy of the hot gases in the plume to provide a driving force. With increasing height, the smoke plume temperature falls. In an atrium hot air may accumulate beneath the roof at high level. If smoke is vented into this atrium a phenomenon called temperature inversion (where the accumulated air is hotter than the rising smoke plume) could lead to stratification of the smoke and the vent system will not work. It is common to specify that the temperature of the smoke should be at least 10°C higher than the estimated ambient temperature to overcome this effect.



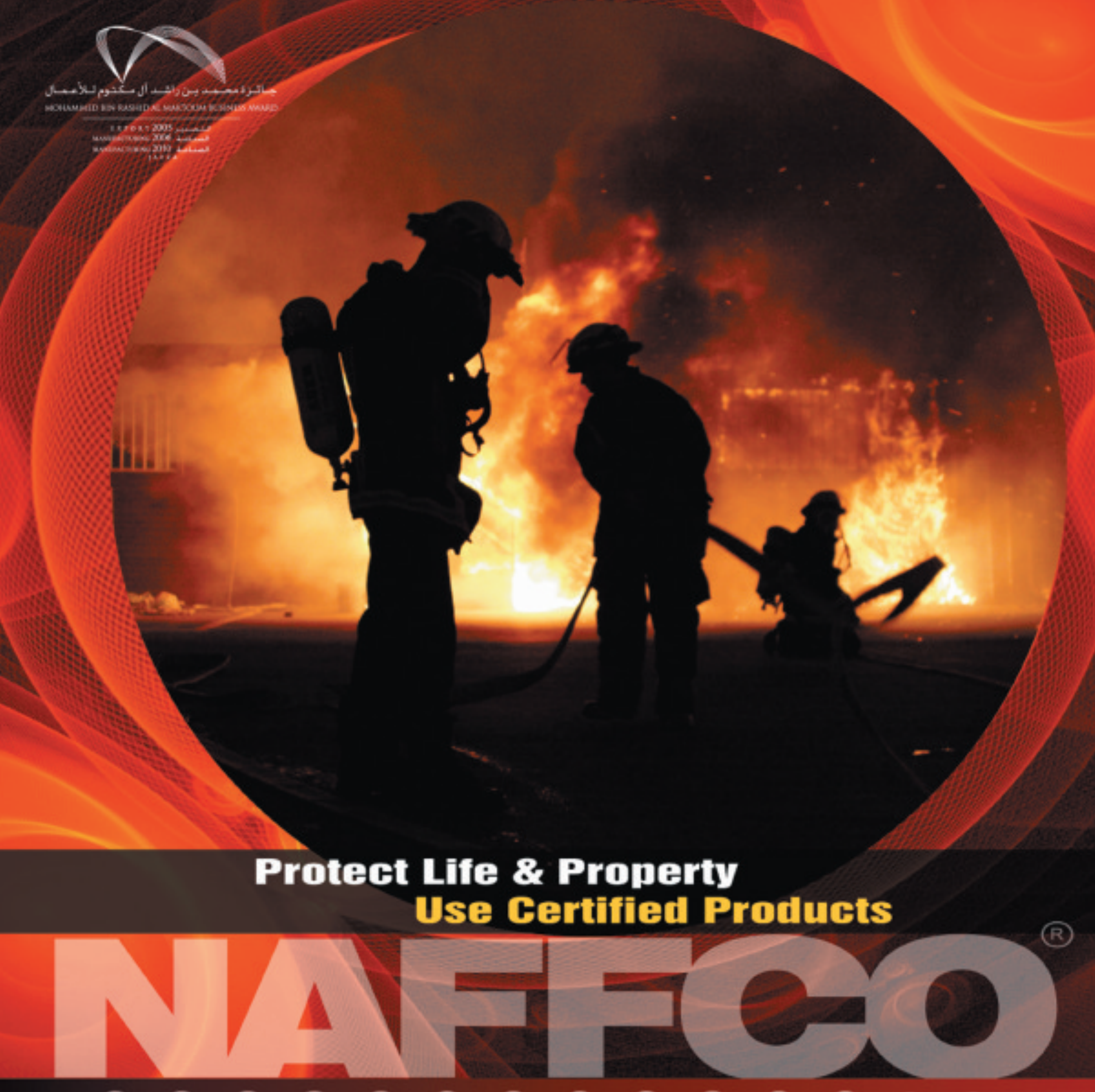
Conclusion

The impact of smoke from fires is often underestimated when assessing risk, and the scientific investigations and derived equations are complex and may therefore not be fully employed.

But we should make the effort to treat smoke with the respect it deserves and design our smoke control systems to operate in a robust manner accounting for the various influencing factors. In doing so we can reduce the overwhelming contribution that smoke makes to fatalities and injuries in fire statistics. IFP

James Lane is Principal Fire Consultant at Hilson Moran

For more information go to www.hilsonmoran.com



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The Business Case Protection

Despite a reduction in the number of fires in the UK, losses to businesses incurred by fire are on the increase. If this trend continues, it is anticipated that by 2020 the UK could lose as much as £10 billion to commercial and industrial fires. The UK would be better placed to mitigate the impact of future losses through the increased acceptance of fire sprinklers in commercial and industrial premises.

By Iain Cox

Chairman, Business Sprinkler Alliance

According to recent data from the Association of British Insurers (ABI), losses in Britain from commercial and industrial property fire reached a record £865 million in 2008 – a 15 percent increase from 2007. In an era when business is already suffering the aftershock of the worst recession in living memory, these mounting and completely unnecessary losses are unjustified and wholly preventable.

Fire losses are felt across the real economy. They impact production downtime in a challenging and competitive commercial environment. They force closures of UK manufacturing sites and encourage the relocation of these facilities to countries where costs are likely to be cheaper. Fires also cost jobs. Estimates of job losses in the UK as a result of commercial and industrial fires have run into the thousands over the past decade.

Fires affect wider stakeholder groups – the local businesses feeding into and from a major facility and the local communities that rely on a manufacturing plant to sustain the immediate economy. Fire causes incalculable damage to both the broader and local environment and these losses are rarely factored into official statistics. Furthermore, and tragically, the human cost as measured by lives lost and injuries from fires is on the rise too.

Unless a step change in the adoption of fire suppression technology, such as sprinklers, is encouraged, these rising costs to business, society and the environment are predicted to continue, with increasingly devastating results. Yet, despite these mounting losses, at the moment less than one percent of commercial and industrial premises in England and Wales are covered by government regulations making fire sprinkler installation mandatory.

At present, in England and Wales, warehouses with a floor surface area over 20,000 square metres must have fire sprinkler protection. This means only around 800 out of over 204,000 commercial premises classified as warehouses in England and Wales might be, depending on where and when constructed, protected against fire.

In Scotland, warehouses with a floor surface area greater than 14,000 square metres must have fire sprinkler protection. This figure is still way too high, and neither code includes factories in this requirement, which means that only a fraction of the UK's entire commercial building stock is protected.

However, the situation in Europe is completely different. Many other European countries have adopted and implemented a much more pro-

Many European countries have adopted and implemented a much more pro-active and robust approach to fire safety than the UK. In Germany, it is mandatory for fire sprinklers to be installed in commercial properties of 1,200 square metres and over. This has resulted in losses of under £400 million in 2008; less than half that of the UK's losses of £865 million in the same period.

For Fire Sprinkler

active and robust approach to fire safety. In the majority of the largest EU countries, fire sprinklers must be installed in commercial and industrial premises with an average floor space of 2,300 square metres.

These proactive regulations mean countries in Europe suffer fewer business losses compared with the UK. For example, in Germany, a nation with a population some 50 percent greater and with a broader industrial base, where it is mandatory for fire sprinklers to be installed in commercial properties of 1,200 square metres and over, these regulations have resulted in losses of under £400 million in 2008; less than half that of the UK's losses of £865 million in the same period.

such as alcohol, without any discernable difference to the measures taken to prevent a disaster.

- There is a growing risk-averse culture where firefighters are restricted in their activities by an increased emphasis placed on safety-at-work regulations. Whether real or perceived, this is inevitably leading incident commanders to become increasingly reluctant to commit to entering and fighting fires in industrial and commercial premises. This means larger facilities are more likely to be left to burn.
- Government now wants green buildings. However, the consequences of "going green", such as the increased fire risk associated with greater

To put things into perspective, if England and Wales were to adopt a more European approach, approximately only ten percent of the industrial and commercial building stock would be affected. Yet imagine the benefits to the UK were it to look more in line with the rest of the continent with regards to fire sprinklers.

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The Business Sprinkler Alliance (BSA) believes a new set of factors have emerged in recent years that have a material impact on the UK and prove the need for urgent action. These are:

- Commercial and industrial fire losses are getting worse – while overall the number of fires is declining, the losses are mounting. Recent data from the ABI showed a 15 percent year-on-year increase in commercial fire damage in 2008. If this trend were to continue UK, business could stand to lose approximately £10 billion by 2020.
- Post-recessionary times mean we must do the most we can to secure the value of the UK. Further unnecessary losses to the UK economy brought on by fire damage will inhibit economic growth and further set-back the UK's emergence from the worst recession in living memory.
- The UK no longer accurately tracks what is stored in its buildings. All goods stored, regardless of their flammability/combustibility or hazard level, are subject to the same "loose" risk management requirements. For instance, a container full of harmless fruits and vegetables could be stored next to a container full of highly flammable and costly materials

use of wood and synthetic thermal insulation, will require an even more measured approach to maintaining the longevity and sustainability of these structures.

- The polluter now pays. Picking up the tab for the environmental damage caused by a fire will have a significant impact on a company's ability to remain competitive. Companies are now being held liable and they will have to pay heavily for the damage they incur to the environment and pay for the losses incurred to the immediate communities.
- Sprinkler technology does not stand still – fire sprinkler technology continues to innovate and improve. Although the concept is over a hundred years old, innovation is happening today faster than ever before, bringing costs down while systems become even more effective in fighting fires – they use less piping, less water and fewer sprinkler heads. These efficiencies translate directly into cost savings both in the installation of a fire sprinkler system (when compared to previous systems) as well as helping minimise the loss incurred, should a fire break out.

The UK simply cannot afford to wait any longer. There are valid reasons that call for immediate action and I would encourage us all to ask ourselves: can we afford to lose more firefighters? Can UK businesses afford to lose £10 billion to commercial fire damage? Can we all afford to waste valuable resources and let our environment suffer? IFP

Iain Cox is chairman of the Business Sprinkler Alliance

For more information go to www.business-sprinkler-alliance.org/

Portable Score 9

By Graham Collins

The debate as to whether portable extinguishers should be used or not is sure to continue, but a recent report from the FIA came down firmly in their favour.

A recent survey by the Fire Industry Association (FIA) has possibly added fuel to the have-or-not-have debate about portable extinguishers that goes on, particularly in the UK. The report highlights that rather than declining in importance, portable fire extinguishers have an even more vital role to play as a first aid response to fire, with 88 percent of fires that are tackled with portables actually being extinguished.

According to the report, this is an increase on the figure from a similar survey conducted back in 2003 that came to the conclusion that in 80 percent of fires where extinguishers were employed, the fires were successfully put out.

On publishing the report, the FIA stated: "There has been much discussion over the past couple of years regarding the role of fire extinguishers. In a world where political correctness and health and safety excesses sometimes override the application of common sense, some quarters have suggested that extinguishers should not be used under any circumstance."

Apparently against this background, the FIA decided to conduct the new survey to see how the role of extinguishers in 2010 compared with the position in 2003. The data collected in the new survey, although a smaller sample than in 2003, showed the same percentage – 75 percent of fires – were extinguished by a portable without the fire and rescue services being called. In terms of the total incidents, there was an eight percent increase in the number of fires successfully extinguished by portables – 88 percent in the 2010 survey compared with 80 percent in 2003.

Extrapolation of the figures from the 2003 report equated this to a cost saving by employing extinguishers of over £500 million to the UK economy and £5.1 million in terms of fire service resource savings. In life safety terms, they were estimated to have prevented the loss of 24 lives and some 1,629 injuries.

Martin Duggan, FIA General Manager, commented: "We have seen cases recently where portable extinguishers have been removed or people are encouraged to ignore them completely and evacuate a building immediately, irrespective of the size of the fire. We work closely with

Out Of 10

the fire and rescue services on many initiatives, so are only too aware of the dangers of fire, but it cannot make any sense to walk past a small fire that could be easily put out with an extinguisher to let it grow into one that can cause significant damage or even the complete loss of a building."

danger, people should be encouraged to extinguish the fire before it spreads." His conclusion? "If there is no extinguisher available because some over-zealous official has decreed they should be removed, then that opportunity is lost. The new survey clearly shows how fire extinguishers continue to be an important line of defence in reducing fire losses."

A full copy of the 2010 report is available on the FIA website at www.fia.uk.com.

The main point of contention appears to be the size of the fire that can be safely tackled, along with the need for appropriate training. Regarding the first point, although not clearly defined, convention says that extinguishers should be used on fires "not larger than a waste paper bin size". However, the test fires used to certify the fire ratings on extinguishers are very significant – certainly much larger than a typical waste paper bin size – to ensure a considerable safety margin in calculating the rating.

It is important, says the FIA, to recognise that those conducting fire ratings tests are, quite naturally, skilled in extinguishing the fires, which leads us onto the second point. Training is important, and the lack of it is a reason cited by those who argue against the use of portable extinguishers. However, people certainly do not need to be trained to the level of those whose job is to extinguish fires as part of the fire rating process. Lack of training is a poor excuse since it is readily available and relatively simple.

In the UK, for example, the Fire Safety Order states that: "Where necessary in order to safeguard the safety of relevant persons, the responsible person must ensure that the premises are equipped with appropriate fire-fighting equipment that is simple to use and indicated by signs. The responsible person must take measures for fire-fighting in the premises and nominate competent persons to implement those measures and ensure that the number of such persons, their training and the equipment available to them are adequate."

It is important, says the FIA, to recognise that those conducting fire ratings tests are, quite naturally, skilled in extinguishing the fires, which leads us onto the second point. Training is important, and the lack of it is a reason cited by those who argue against the use of portable extinguishers.

He continued: "Of course, life safety must come first, but the analogy I would draw is that if you drop a lit match onto a carpet, you calmly tread on it to extinguish the flame. You certainly do not immediately evacuate the building. Common sense has to be applied, but if it is a small fire that can be readily tackled without putting yourself in

Through schemes such as the SP101/ST104 from BAFE (British Approvals for Fire Equipment), third-party assurance is given that registered companies are competent to supply the correct extinguisher for a given application, in the right place and with the right – and easy to understand – operating instructions and signage. IFP

Getting The Best Fr

Beam Smoke Detectors are available for Hazardous Areas

By Jon Ben

Fire Fighting Enterprises Ltd.

Large, expansive indoor areas can present a challenge to traditional fire safety systems where, in order to effectively detect smoke, complex networks of multiple overlapping sensors are required. Optical beam smoke detectors, on the other hand, are designed exactly for such situations.

A single optical beam detector installed on a wall can detect smoke over an area of up to 1500 square metres, resulting in fewer detectors, faster installation reduced installation and wiring cost, and less aesthetic intrusion. Mounting on the wall – as opposed to the ceiling – can allow more convenient access for maintenance, and a low-level controller further speeds and eases the process. A space that might need as many as 15 point detectors could, therefore, be maintained from one single low-level controller, as opposed to organising height access to 15 different detector locations.

There is already a lively debate about the relative merits and drawbacks of different detection systems, with a common theme being that beam detection may not be as reliable or trouble-free as other methods. However, this is almost always due to incorrect installation and beams, in fact, can be much more suitable for some situations than other detection systems.

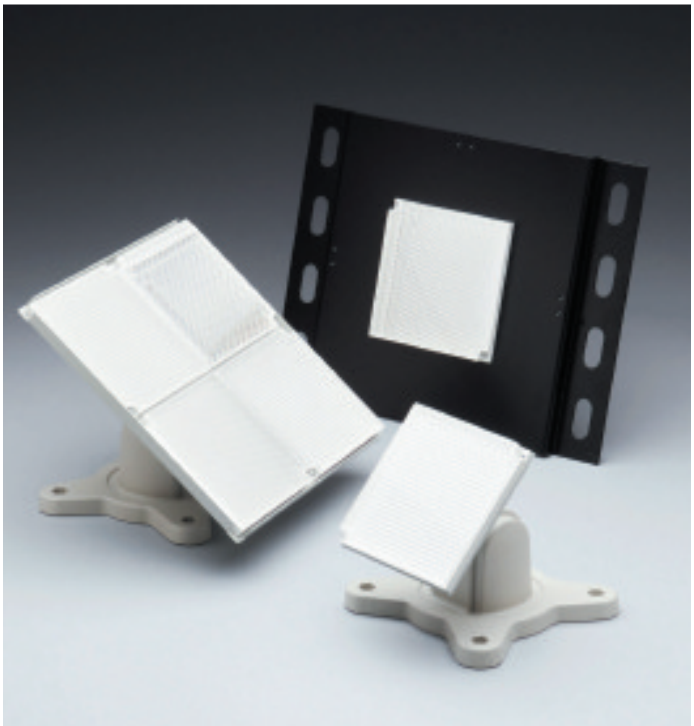
How beam detection works

An optical beam smoke detector works on the principle of smoke particles interfering with the transmission and reception of a beam of infra-red (IR) light. A transmitter sends out a beam of IR light, and a receiver a set distance away measures the amount of IR light received. When smoke enters the beam's path, the intensity of IR received is reduced; when this reduction reaches a pre-defined limit the alarm signal is triggered and sent to a fire control panel.

Most beam detector systems consist of a transmitter, receiver and control unit. The transmitter projects the beam; the receiver at the "end" of the beam measures its intensity with a photosensitive sensor; and the control unit analyses and interprets the signal before communicating the detector's status to a fire control panel. These three elements can either be entirely separate or completely integrated, depending on the system chosen. When the transmitter and receiver are in the same unit, a prismatic panel is fitted to the opposite wall where the receiver would normally be positioned, reflecting the beam back to the source – further reducing wiring requirements.

A good visual analogy is a torch beam of visible light, where the beam expands outwards in a cone, its intensity dropping with distance from the central axis. Beam detectors essentially detect how much "darker" the end of the beam has become due to smoke interference. In a torch light, as with IR, beams can cross without scattering, which is what allows reflective beam systems to function. IR light is used, as it is significantly affected by both smoke particles and the heat haze of a fire, and is invisible to the human eye – somewhat less intrusive than an actual torch beam.

om Beam Detection



Prismatic reflectors are installed on the opposite wall when the beam transmitter and receiver are in the same unit

Overcoming common problems

A minor, gradual increase in obscuration is not typical of smoke interference, but might well be due to dust and dirt build-up on the active surfaces. Software in more advanced beam detectors can detect this slow change, and increase the gain (a form of signal amplification) to automatically compensate for this. By contrast, sudden and very high beam obscuration is almost certainly a solid object in the beam's path, and will trigger a "Fault" status, so the path can be cleared. In this way, "intelligent" beam detector systems are able to perform accurately and effectively over a long period of time and with minimal manual maintenance.

Detector types

There are two fundamental types of beam detectors. End-to-end systems have the transmitter and receiver on opposite sides of the area to be protected. They can be up to 100 metres apart, and the receiver can be connected to a control unit installed at ground level for easy maintenance. Reflective systems have the beam transmitter and receiver in the same housing (a transceiver), with a reflective plate on the opposite wall. This can still be up to 100 metres away, and the plate is prismatic so it will reflect the beam straight back, even if it is not mounted perpendicular to the transmission path.

End-to-end systems are relatively unaffected by stray reflections from surrounding surfaces and obstructions near the beam path. A reflective system, although potentially susceptible to objects near its line of sight, is easier to install and requires less wiring as power is only needed by the single transceiver unit. Essentially, end-to-end beam detectors can operate effectively through narrower "gaps", and will often be more suitable in more confined areas or those with numerous obstructions such as cluttered roof spaces. In spaces where this is not an issue, reflective systems will usually be more convenient.

Very recently, technology was also developed that allows the use of multiple transceiver heads running on one single controller. This delivers cost-effective protection for larger areas, and improved coverage options for unorthodox indoor spaces.

Motorised and manual adjustment

New developments in beam detection technology have led to a choice between inexpensive simplicity and intelligent automation.

Traditionally, adjusting the beam's power and direction had to be performed manually at the time of installation, and then maintained over time to compensate for dust build-up and "building shift". This is where building elements can gradually move in very slight increments, affecting the beam's aim and effectiveness. Recently, the option has become available to choose automated, motorised beam adjustment. This technology uses data from the unit over time to automatically adjust its direction and sensitivity to keep the beam accurately aligned and the signal at an optimum level. This is fast, reliable, and eases installation, as well as reducing both the need and time taken for continued maintenance.

As already mentioned, by their nature beam detectors cover a huge area, and so require fewer units and wiring than other detector types; but there are other things to consider as well. Beams are less affected than other types of detector by high ceilings, harsh environments and airflow blowing smoke away. As a smoke plume rises it becomes less dense, which leads to a maximum operating height for point detectors since the particle density can fall below the alarm threshold. Since a beam operates over a linear path, the density of the plume has no effect – only the total number of smoke particles in the beam path. As the plume widens, it involves more of the beam, making beam detectors more effective as height increases compared with other detectors.

Blowing smoke

Similarly, airflows that might blow smoke away from point detectors' tiny sensor chambers are going to have less effect on the long, wide detection pattern of a beam system. Dust and dirt build-up is taken care of by automatic beam signal strength compensation, and extreme temperatures have relatively little effect on the technology –

there are even beam detectors suitable for use in explosive atmospheres.

A related, but separate, problem can occur when a rising smoke plume draws in surrounding air and cools rapidly as it rises, sometimes actually becoming colder than the air above it. In this situation, most commonly seen in high-ceilinged spaces, the smoke spreads out below the layer of warm air, as though trapped under an "invisible ceiling" of its own. This is known as stratification, and it can render ceiling-mounted detectors ineffective due to the lack of smoke particles reaching them. A typical solution to this problem involves installing supplementary detection at lower levels to detect the stratified layer or even the plume itself. Beam detectors are wall-mounted, typically up to 600mm below ceiling level, thereby giving them a significant advantage in detecting stratification layers.

Breathe easy

High Sensitivity Smoke Detection (HSSD) or aspirating systems are another option for large indoor spaces, however they suffer from their complexity and installation requirements. A network of end-caps, sampling pipes, brackets, elbows and labels must be designed, fitted and maintained, which can be costly and inconvenient. The aspirating pipe itself can also be quite obtrusive, and hiding it requires yet further cost and complexity due to the need to install capillary tubes and drilling into the ceiling.

Getting the best out of beams

As with almost all technology, an optical beam detector will work much better if it is properly installed and maintained. Most reported and "common knowledge" problems with beam detection actually stem from improper installation and usage, but can be easily avoided by following some basic rules coupled with common sense.

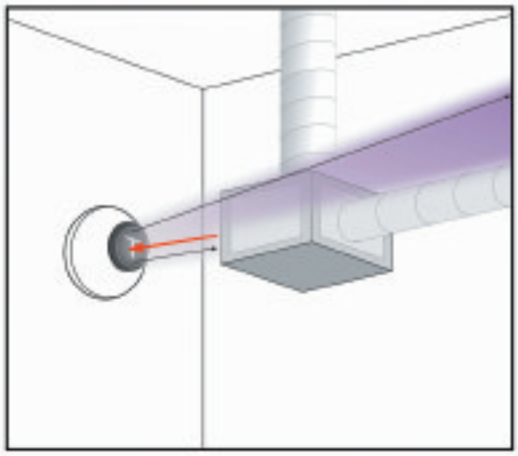
A stable base

Beam detector elements must be mounted on rigid, stable surfaces to limit the risk of misalignment; as with a torch, a tiny change in the transmitter's angle will cause a large movement at the other end of the beam.

Common problems come from mounting beams on potentially flexible building surfaces such as cladded walls or on free-hanging assemblies. Even building purlins can move as they are particularly subject to ambient temperature changes causing contractions and expansions, so are not recommended as stable fixing points. So, if direct mounting onto brick or block walls is not possible, it is recommended that beam components be installed onto secure, rigid metal frame assemblies suspended from rigid steel joists.

Reflection perfection

Reflective optical beam detectors can be affected by objects or surfaces close to the line-of-sight between the beam and reflector. Obstructions will not only interfere with the received signal, cutting

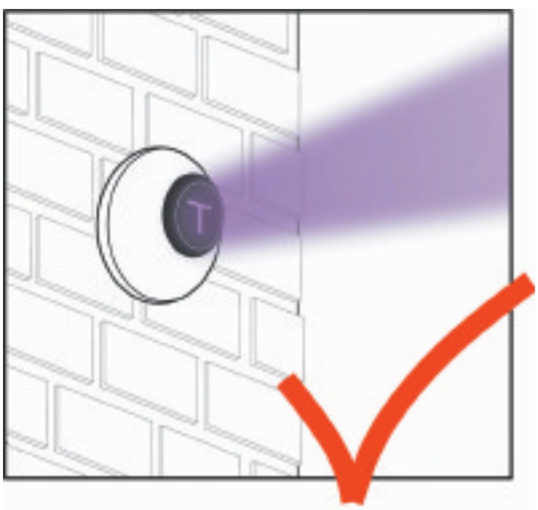


Obstructions can impair reflective beam systems

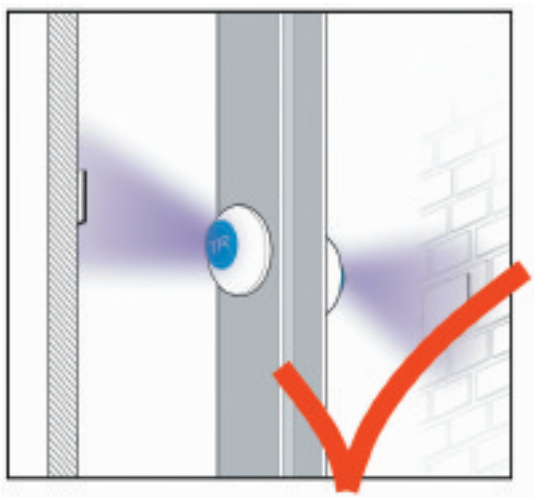
the IR intensity, but could leave areas hidden by their "shadow". If an obstructive surface was mistakenly used for alignment during initial installation, it would leave the area behind it completely unprotected. Confirming correct alignment is therefore vital, with cover-up tests of the reflector a sound method for ensuring that the whole area is properly protected.

IR interference

Beam receivers should always be positioned to avoid other sources of IR light. In the first instance, where multiple beam detectors are in effect, each receiver should only have its associated transmitter's beam falling on it. If it is within the beam of



A good stable fixing surface



Correct 'back-to-back' transmitter placement

Multi-head transceivers can operate from a single controller

another detector system, "crosstalk" can occur producing false "Fire" and "Fault" conditions. If two systems must be daisy-chained to cover a long distance, the transmitters should be mounted back-to-back rather than the reflectors or receivers, to minimise interference. Other strong IR light sources, such as direct sunlight, can cause IR saturation whereby – much as with the human eye – it will be too "bright" to function properly. Normal fluorescent lights emit very little IR light, though incandescent bulbs, sodium lamps and camera flashes emit more and beams should be positioned to avoid such stray light falling directly onto the receiver.

Spacing

Standards such as EN54-12 dictate the design and construction of optical beam smoke detectors. It is important to note, however, that beam installation is governed by the relevant national Code of Practice. Codes can vary by territory in their definition of the accepted width of coverage of a beam, and its allowable height from the ceiling. The operating range (linear distance) for a beam is dictated by the manufacturer's design and the approval gained for each beam detector product.

Creatures of the night

One last, occasional concern is that various "creatures of the night" – usually bats and owls – might set off false alarms by flying along the apex of a gabled or pitched roof. Although this could conceivably be a problem, some beam detection systems can have a delay timing set. This would then send a fault or fire signal only after that condition had been registered for a certain time – long enough for any flying trespassers to flit away again.

Beam detectors are an excellent option for wide-area smoke detection, covering much larger areas than point-type smoke detectors and with minimal wiring requirements when compared with smoke aspirating systems.

Conclusion

In short, beam detectors are an excellent option for wide-area smoke detection, covering much larger areas than point-type smoke detectors and with minimal wiring requirements when compared with smoke aspirating systems. Different beam systems are available to suit different projects, depending on issues of cost, wiring and space. Possibly the most important point though is that, even the best technology in the world, it is worth nothing if it is not used correctly. So, following the golden rules for installation is vital for safety and success. Bearing this information in mind, optical beam smoke detection can – and should – be considered a leading light in fire protection systems for large indoor areas. IFP

Jon Ben is Technical Director at Fire Fighting Enterprises Ltd.

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EN54-20: Smoke Detection's Essential Building Block

By Peter Massingberd-Mundy

Technology and Expert Practices Manager, Xtralis

Following the introduction EN54 Part 20, since June 2009 all Aspirating Smoke Detection (ASD) systems installed in Europe need to be designed using products which comply with this harmonised product standard.

As a foundation, EN54 Part 20 – the European product standard for aspirating smoke detection (ASD) systems – provides an essential springboard for specifying, designing and installing reliable and truly effective smoke detection systems.

The standard, first published in June 2006, defines the performance capability of an ASD system in terms of both sensitivity and "fitness for purpose". It introduced three classes of sensitivity; Class A being very high, Class B enhanced and Class C normal sensitivity. ASD systems in the Class C category provide the hole equivalent to traditional point detection. As the standard encompasses the core fire performance tests for EN54-7 for point detectors, ASD systems must be capable of detecting smoke from the standard test fires while set up in a "worst case" configuration. Essentially, when smoke from the standard test fires in EN54-7 enters a single hole, the ASD system must signal an alarm.

A class above

Meanwhile, Class A and Class B systems offer better sensitivity for earlier and more reliable detection. ASD systems in these classes provide much earlier smoke detection for more critical and demanding applications, with EN54-20 going beyond EN54-7 with the introduction of additional fire tests in these two classes.

A Class B system must detect a series of fires that produce significantly less smoke than the EN54-7 standard fires. In fact, for smouldering fires of wood block and cotton wick, the smoke concentration is 13 times less. Class A systems must detect a series of test fires that produce even less smoke – about 40 times less smoke in the case of the smouldering fires. As with Class C systems, this relates to the sensitivity of a single hole.

The classes allow designers and installers to clearly specify the sensitivity they require for a particular application. Indeed, it is often the case that a Class A and/or Class B alarm signal is specified in conjunction with a Class C alarm – all from the same ASD system. The intention being that the Class A and/or Class B signals are used to trigger a very early warning or pre-alarm condition (respectively) and a full evacuation "fire" alarm is not signalled until a Class C threshold is exceeded.

In other cases, a Class B "enhanced" system is specified to provide confidence that smoke will be detected in areas where it is likely to become diluted, for example in areas with ceilings over eight metres or in voids or shafts where airflows are present, or where the protected area contains artefacts that would be particularly susceptible to smoke damage. Examples include heritage buildings, museums and document banks.

Guidelines for the design, installation, commissioning and maintenance of ASD Systems are set out in the Fire Industry Association's (FIA) Code of Practice that incorporates the EN54-20 sensitivity classes and provides recommendations not only as to where to use each class and how to install the system, but moreover how to test them using a set of standard field-based test fires.

Class A – very high sensitivity

An ASD system with very high sensitivity that is capable of providing very early warning of a potential fire condition. Such systems are particularly relevant for high-risk areas where staged responses to the multi-stage alarm conditions are justified to ensure minimum down time of the protected area that may result from any fire related incident.

Class B – enhanced sensitivity

An ASD system with enhanced sensitivity for applications where an additional degree of confidence is required for the protection of a particular risk. The enhanced capability of such systems is often required to compensate for other risk factors in the protected area, such as unusually high ceilings or significant air flows.

Class C – normal sensitivity

An ASD system designed to give equivalent performance to standard point detection systems meeting the requirements of EN54-7.

Source: Fire Industry Association Code of Practice for Design, Installation, Commissioning & Maintenance of Aspirating Smoke Detector (ASD) Systems.

Photo courtesy of BRE

Across Europe installation rules are beginning to emerge with reference to ASD class, and most recently it was adopted as an international standard, ISO 7240-20, also leading to a tightening up of ASD labelling.

The cumulative effect

While the principle of ASD is simple – smoke samples are drawn into a central detector through sampling pipes and holes – by their very nature ASD systems have a natural advantage when compared with point-type detectors as they are sampling from many different points in a space.

The conservative approach to ensuring that an ASD system matches the detection performance of a standard EN54-7 point detector means that (as stated previously) when smoke from standard test fires in EN54-7 enters a single hole, the ASD must signal an alarm. Imagine a system with 20 holes, if smoke enters only one hole then it is mixed with clean samples from the other 19 holes before it reaches the detector. As such, the detector in a multi-hole ASD must be many times more sensitive than a standard point detector in order to detect the standard test fires required by EN54-7.

While this "dilution effect" does not need to be considered for point type detectors, it has a distinct advantage in practice. In any real fire scenario, it is highly unlikely the smoke will only enter one hole. ASD systems therefore have a natural ability to detect "diluted" smoke in the space. As smoke naturally disperses and diffuses in volumes, the more sampling holes it enters, the higher the effective sensitivity of the ASD becomes.

This cumulative effect, where smoke enters more than one ASD sampling hole simultaneously, is particularly useful in high-airflow environments or areas where high levels of smoke dilution is anticipated.

ASD applications

Traditionally ASD systems have been used for applications where early warning of fire is needed, and protection of property assets is key; for instance business-critical computer server or telecoms installations, where it is crucial that a fire is identified before it can cause disruption and jeopardise business continuity. Of course, early warning also allows additional time for safe evacuation.

The FIA highlights three key reasons for using ASD; very early warning, enhanced smoke sensitivity and as an alternative to point or beam type smoke detectors. Common motivators include extreme environments, restricted/difficult access, exceptional ceiling heights and heat barriers, aesthetics, risk of mechanical damage, anti-vandal systems and hazardous environments.

Class B applications, including large, open spaces such as warehouses, cold-storage facilities, manufacturing environments, and cable tunnels all benefit from the inherently higher sensitivity at each sampling hole and from the cumulative effect. Thus ASD provides a double advantage to provide reliable very early warning fire detection in situations that would present a challenge to conventional detection methods.

The FIA highlights three key reasons for using ASD; very early warning, enhanced smoke sensitivity and as an alternative to point or beam type smoke detectors.

At this juncture, we must address a common misconception that ASD systems are prone to false alarms. This is strictly not true. Ignorance of the nature of ASD's cumulative effect underlies many misconceptions about false or unwanted alarms from high sensitivity systems. Our field experience with extremely stable, fixed calibration VESDA technology shows that ever more environments tolerate stable Class B detection, with filters to reduce nuisance alarms. In fact, early warning technology avoids false alarms and unnecessary evacuations, though by its very nature if a fire is detected early it is not really a "fire" – and unfortunately there are no statistics collected on "near misses" in the fire industry.

BRE is soon to publish research on the performance of detectors in high ceilings, where ASDs were tested alongside beam detectors in a 43.5m high warehouse We eagerly await publication of the findings as they provide important evidence that will influence changes to several European Installation codes (including BS5839-1) which currently give very conservative ceiling height limitations for ASD systems. The findings also provide further guidance for the detection capabilities of beam detectors in high ceiling spaces

Other applications where ASD is commonly used include where building aesthetics are of concern or where the environment presents challenges with respect to maintenance access or harshness, or areas where high airflows are present.

While Class A and Class B sensitivity and the cumulative effect are trade marks for the advantages of the ASD technique, there are some applications where normal sensitivity Class C detection – using only one or a few holes and a normal sensitivity (EN54-7) point detector – has advantages. Such "point in a box" type systems invariably demonstrate improved performance when compared with the un-aspirated point detector, because the smoke entry characteristic is improved significantly by using forced aspiration as opposed to passive diffusion or local "drafts" to transport smoke into the detection chamber.

There is therefore space in the ASD marketplace for Class C products, notably those that use a point-type detector with a nominally normal sensitivity detector, in those areas where there is not the cumulative effect. Most importantly, the consequence of a Class C approval to EN54-20 is a confidence that the particular system is at least as reactive to fire as any EN54-7 point detector. And the advantages of ASD technique still apply; aesthetic or concealed detection, ease of access for maintenance, plus the opportunity for sample conditioning or filtering for challenging or dirty environments.

The impact of EN54-20

Looking at the ASD sector today, it is clear that the establishment of EN54-20 has improved the quality of products in the marketplace. Tighter flow monitoring requirements have led to improvements and, where necessary, the withdrawal of non-conforming products from the market.

As a result of EN54-20 becoming the mandatory standard, people are specifying ASD, but still not as much as they might. There is still plenty of room for enlightenment among specifiers and installers as to the many advantages of ASD, as well as dispelling some of the misconceptions that stem from the unrivalled sensitivity that can be provided by ASD.

In the UK, ASD is a well-accepted method of smoke detection and fire prevention, and accounts for approximately 13 percent of smoke detection spend. Elsewhere in Europe, ASD counts for approximately seven percent, but as a result of a harmonised European standard it is becoming more widely accepted, so we can expect this percentage to rise.

When first introduced over 20 years ago, ASD systems were frequently specified alongside point detection systems. Under approvals to ad-hoc product standards (prior to EN54-20) it became increasingly recognised that ASD systems are reliable and can provide "equivalence" to point detection – thereby negating the need for point detectors.

With the publication of EN54-20 in 2006, the clear definition of three sensitivity Classes made it clear that ASD systems are able to detector lower concentrations of smoke than a normal point detector. In 2010, a year after EN54-20 became mandatory across most of Europe, the benefits of correctly specified ASD are being exploited in more and more applications. IFP

Peter Massingberd-Mundy is Technology and Expert Practices Manager at Xtralis

For more information go to www.xtralis.com

EN54-23: Rising To

By Mark Thomson

KAC Alarm Company

Regulations and legislation such as the UK's Disability Discrimination Act (DDA) make service providers and employers responsible for ensuring that disabled people do not receive less favourable treatment than the able bodied. The fire alarm industry has responded by providing detection systems that generate both audible and visual warnings when a fire is detected.

Normally, a visual alarm is only used in a fire alarm system to reinforce a warning from the primary audible warning device such as a bell, siren or voice alarm, but it is never the primary method of raising the alarm. However, in a building in which deaf and hard of hearing people are present, a risk assessment may indicate that a visual alarm will have to become as important as the normal audible alarm in attracting their attention. In such cases, the strobe units or beacons must produce a sufficiently high light output to achieve the objective. By definition, as a life safety industry, anything that improves the effectiveness of an automatic fire system is an advance to be welcomed, particularly if it provides enhanced protection for all occupants of the protected building. Until now, however, there has been no product standard specifying the performance requirements of visual alarm devices.

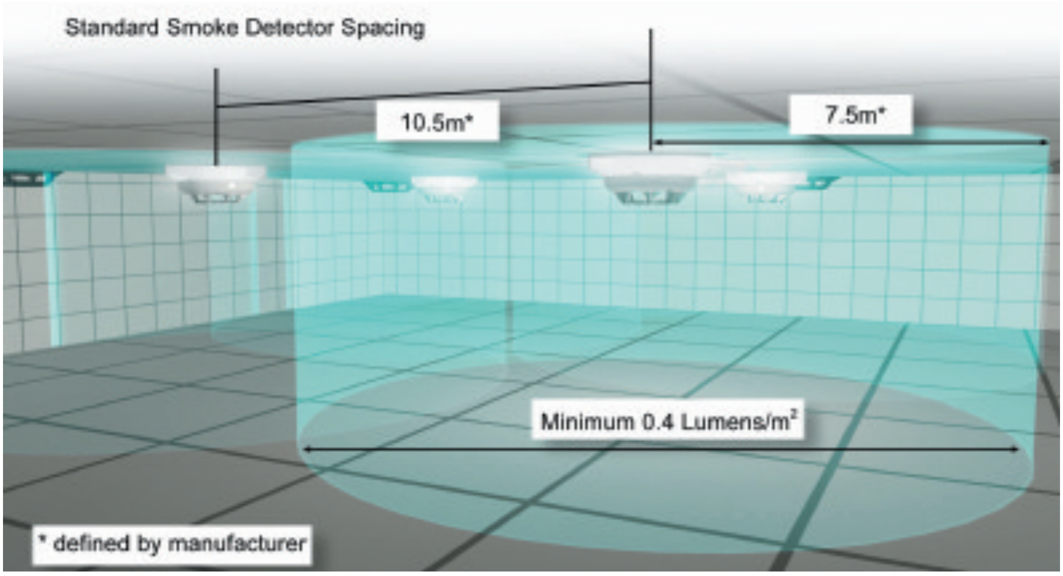
BS EN54-23

The product standard BS EN54-23:2010 (Fire detection and fire alarm systems. Fire alarm devices. Visual alarm devices) defines the performance requirement of visual alarm devices and was published by BSI in June 2010. Typically, for fire detection and alarm product standards produced to satisfy the EU Construction Products Directive (Harmonised Standards), there is a 36-month transition period from the time the standard becomes available to national standards bodies. At the end of this transition period, products that do not satisfy the harmonised standard (indicated by a CE Mark), will no longer be able to be put on the European market. In the case of EN54-23 the date by which national conflicting standards must be withdrawn is March 2013.

The standard specifies the requirements, test methods and performance criteria for visual alarm devices in a fixed installation, intended to signal a visual warning of a fire initiated by the fire detection and alarm system. It covers only those devices that derive their operating power by means of a physical electrical connection to an external source, such as a fire alarm system, and it applies only to pulsing or flashing visual alarm devices – for example Xenon or rotating beacons and devices that rely on software for their operation.

The introduction of a mandated harmonised standard sets a base level for product performance. Fire system engineers can therefore be reassured that when approved strobes are installed in accordance with the manufacturer's recommendations, they will provide the defined level of illumination in the protected premises. Under the specification, manufacturers have to classify their products as C, ceiling mounted, W, wall mounted, or O, open class devices. In a fire system, both

The Challenge



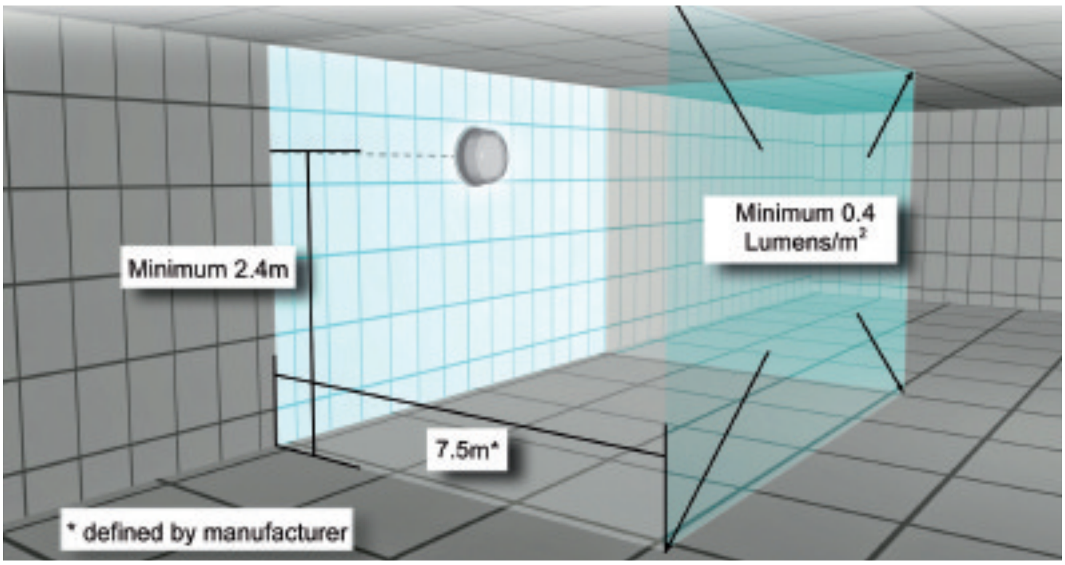
C and W devices will be the primary types used, with some specialised applications having type O devices as well. The C class units often take the form of a detector base sounder-strobe, fitted between a multi-sensor, smoke or heat detector and its base. W class devices will be either stand-alone strobes or combined sounder-strobes. The key performance indicators are that the output of the device must be greater than two candela (cd) and less than 500cd, and the flash rate must be between 0.5 and 2.0Hz.

The critical requirement from a manufacturer's point of view is that each model must be tested to demonstrate compliance with the Standard's requirements. For ceiling-mounted devices, the manufacturer must define the maximum height at which it can be installed, set at a standard three metres, six metres or nine metres. A wall-mounted device must be installed at a minimum of 2.4 metres from the floor. The coverage volume, defined by the manufacturer, in which the output meets the minimum required illumination of 0.4 lumens/m^2 (lux) on a surface perpendicular to the direction of the light emitted from the device is the key performance measure.

Further relevant documents are BS 8300:2009+ A1:2010 (*Design of buildings and their approaches to meet the needs of disabled people. Code of practice*) and LPS1652 (*Code of Practice for Visual Alarm* Devices used for Fire Warning) currently at Draft 1.0 status and published by LPCB Loss Prevention Certification Board).

Implications for the fire detection industry

Clearly the industry welcomes a new product standard that will ensure that alarm signals are as consistent and effective as possible throughout the areas in which they are installed. However, it is apparent that almost no visual alarm device on the market today will meet the requirements of EN54-23 in a manner that will allow the



established custom and practice on spacing of devices within protected premises to be maintained. The issue arises because current products, designed to reinforce an audible warning, are often not bright enough to attract attention by themselves at any meaningful distance, unless they are in the direct line of sight.

It would appear to be a relatively simple problem to design and manufacture higher output visual alarm devices. However, there is considerable concern as to whether existing technology – particularly in respect of loop-powered addressable beacons – is able to meet the performance requirements. The limitations arise as the result of the zone current available from the control panel, the inefficiencies converting the incident electrical energy into light, and lenses and reflectors that are not necessarily designed to maximise the light transmission generated by the source. When the use of coloured lenses is added into the equation, the problem is exacerbated

The issue that these deficiencies raise is quite simple: fire system engineers and installers will want to maintain existing spacing when fitting compliant strobes in order to keep cost and complexity under control. However, initial experiments suggest that using existing technology and designs, the alarm current for a loop-powered strobe is likely to have to rise from the typical value of 2 to 3mA to 30-40mA, the non-linear increase resulting from efficiency reductions in converting the incident electrical energy into light rather than heat. With a loop typically able to provide around 400mA, this will severely restrict the number of devices, leading to significant system design issues.

Alternative approaches

Accordingly, there are two possible alternative options. Conventional visual alarm devices, interfacing with the loop via modules, could be used. The strobes could be powered from separate power supplies to overcome the current limitation issues, and there are many high output conventional strobes already available that would give the required levels of illumination at a realistic distance. Of course, there are drawbacks. Individual control and management of any particular strobe is lost and installation and equipments costs will increase with the need for interface modules for each bank of strobes.

The second option is to take the introduction of the new standard as a challenge, and develop addressable strobes that will generate sufficient output to enable the established customs and practices in system design to be preserved. The size of this task should not be underestimated; it is one that the industry has to overcome in order to improve the protection given to building occupants, particularly those who suffer from total or partial deafness. They should not be placed in greater danger in the event of fire purely because of potential technological difficulties; it is the job of the industry leaders to harness the resources available to provide a workable solution.

In order to improve the conversion efficiency, the new generation of addressable strobes will almost certainly have to use either a Xenon strobe or high output LEDs. Both have potential problems in terms of current draw and heat generation, but they are the most likely contenders in the quest to produce a light output at least an order of magnitude greater than current devices. New designs of reflectors and lenses will be needed to ensure that as much as possible of the generated light is concentrated where it is needed – forwards and down in the case of a wall-mounted device. Almost certainly, white light strobes will become the norm because the greater range of frequencies enables more light energy to be produced.

Time is short. It will not be very long until approval to EN54-23 will become mandatory under the CPD in March 2013, and KAC, for one, is well on the road to meeting this new challenge to benefit the industry and the people it protects. IFP

Mark Thomson is Marketing Manager at KAC Alarm Company

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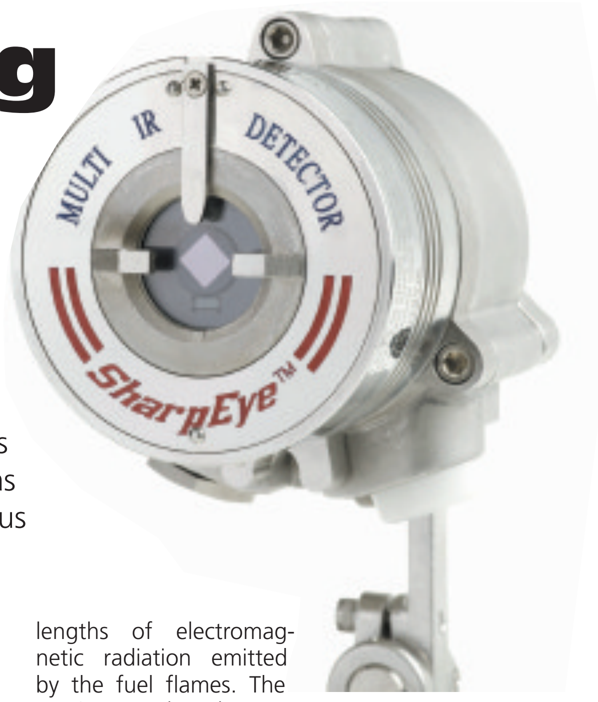
Protecting High-Risk Plant

By Ian Buchanan

European Manager at Spectrex Inc.



The protection of high-risk, high-value assets and personnel has never been more vital. Such installations include onshore and offshore oil and gas plant, petrochemical plant and hazardous material handling and storage.

In many situations, high-risk plant is classified as hazardous due to the presence of potentially flammable or combustible materials and require that all potential sources of ignition be protected by suitably designed and approved housings, for example flameproof Exd, to standards such as IECEx, ATEX, FM and CSA. Many installations also require to be assessed against IEC 61508 for functional safety integrity (SIL).

A key element is the fire detection and protection systems that include a wide variety of detector types and controls to rapidly identify a fire hazard and prevent or extinguish the fire before it becomes a danger to plant and personnel.

For high-risk areas and outdoors, optical flame detectors, like that shown in fig 1, are the favoured solution for this critical role, as smoke and heat detectors are not effective outdoors. Unlike smoke and heat detectors, the fire and products of fire – smoke and heat – do not have to reach the optical detector to be recognised, as it "sees" the radiation from the flames from a distance of up to 65 metres over a 100 degree cone of vision in all directions.

Optical flame detectors provide the fastest detection of a fuel fire in the early ignition stage. Their fast response capability, adjustable field of view and programmability make them extremely well suited for this role. Flame detection, with high sensitivity and immunity to false alarms, is an essential determining factor when designing systems for this application.

They operate by sensing one or more wave lengths of electromagnetic radiation emitted by the fuel flames. The precise wavelengths vary depending on the fuel being burned (the chemical reactions that generate energy in the form of electromagnetic radiation), the oxygen supply to the flames, and environmental conditions that affect the radiation transmission in the atmosphere.

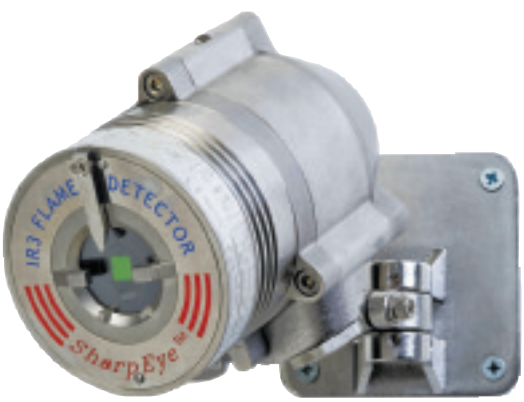


Figure 1

Many combustible materials include hydrocarbons that typically generate hot carbon dioxide (see figure 2). In the presence of an actual fire, the radiation intensity in the carbon dioxide peak band is usually high, while little or no radiation is received in the side bands. Thus, high radiation intensity in the peak band, as compared with that in the non-peak side bands, is used to determine whether a flame is present.

In addition to the two major fire products (CO_2 and H_2O), other intermediate radicals and ions and by-products created in the fire process (such as CO, CHOH, COOH, CH_3 and OH) emit electromagnetic radiation that can be detected either in the UV solar blind spectrum or in the wide IR bands.

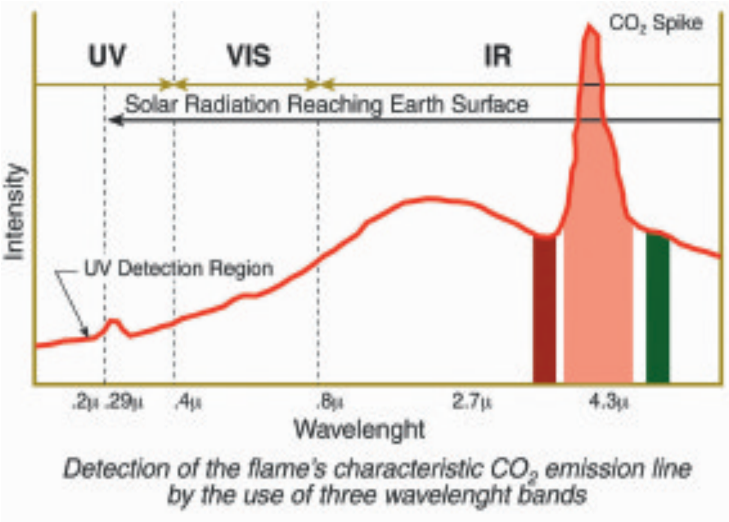
Developing technology

Flame detection has come a long way from the early days when a simple UV sensor was used. Whilst the UV method was a very good and fast fire detector, it was also a good detector for all sorts of other radiation sources that were not fires, for example, the sun and arc welding. These false alarms led to a lowering in confidence in such detectors. They also had a limited detection distance – usually 15 metres at best.

Over the years, other types and combinations of sensor types were invented, including single infrared (IR), combined double IR, combined UV/IR. All were tried and found deficient in one way or another, mainly due to false alarms and/or low sensitivity due to short range detection.

Today, the most respected and widely used method is Triple Infrared (IR3) technology using three different IR wavelengths. This type of spectral analysis ensures no false alarm to any continuous, modulated or pulsating radiation sources other than fire (including sources like black

Figure 2



or gray body radiation). The high sensitivity of the Triple IR technology coupled with its inherent immunity to false alarms enables substantially longer detection ranges than previously obtained with standard detectors.

This detection approach offers:

- Fast response – less than five seconds.
- Long range detection – up to 65 metres from fire.
- High sensitivity to small fires.
- Highest immunity to false alarms.
- High reliability and availability (IEC 61508-SIL2 TUV approved).

Latest solutions

These benefits are combined in the Spectrex 40/40I IR3 flame detector with additional features to ensure unattended, reliable operation such as automatic integral self-test (every 15 minutes); heated optics to ensure continued operation in extreme weather conditions; a wide variety of interfaces (relays, milliamp, ModBus, HART); a long warranty period of five years; along with independent third-party performance approvals (EN54-10, FM 3260 etc).

These types of detector are used to detect fire from hydrocarbon fuels, gases and materials, mainly focusing on the resultant carbon dioxide (CO_2) produced from such fires. However, until now, "invisible" hydrogen fires were detected by UV type detectors, as the products of the hydrogen fire were different (no CO_2 product from the fire) thus detection distance was very limited. Now, the Spectrex 40/40M Multi IR flame detector, incorporating four IR sensors, allows simultaneous detection of hydrogen flames at distances of 30 metres as well as detecting hydrocarbon fires up to 65 metres distant.

The Triple/Multi IR detection technology overcomes the long-time problem of false alarms. One of the problems in detecting small fires in the high-risk oil and gas industries, particularly at long ranges, was the potential for a high false alarm rate. False alarms could be generated by other electromagnetic radiation sources that are either termed as "friendly fires"(like flares in the petrochemical industry) or by spurious radiation sources, such as direct and reflected sunlight, artificial light, welding, electrical heaters, ovens, and other sources of "noise".

A false alarm could result in a costly discharge of the fire extinguishant, and if the fire extinguishant is of the type requiring replacement before reuse, the false alarm may disable the fire suppression system until it has been replaced or recharged and cause facility shut-down.

Several generations of optical flame detectors have been developed to address the various fire and explosion hazards, particularly in modern oil and gas exploration, processing storage, loading and shipping facilities. The Spectrex 40/40 Series is the most durable and weather resistant range of flame detectors currently on the market. Its features include a heated window, to eliminate condensation and icing; HART capabilities for digital communications; lower power requirements and a compact, lightweight design.

These detectors are fully tested to withstand harsh environmental conditions, including strong vibration, elevated temperatures in excess of 85°C, as well as deep freezing conditions of –55°C, high density fog, rain, snow and other extreme environmental conditions. This makes them ideal for installation in isolated and often difficult to reach industrial facilities located in Alaska, Siberia or on offshore oil rigs.

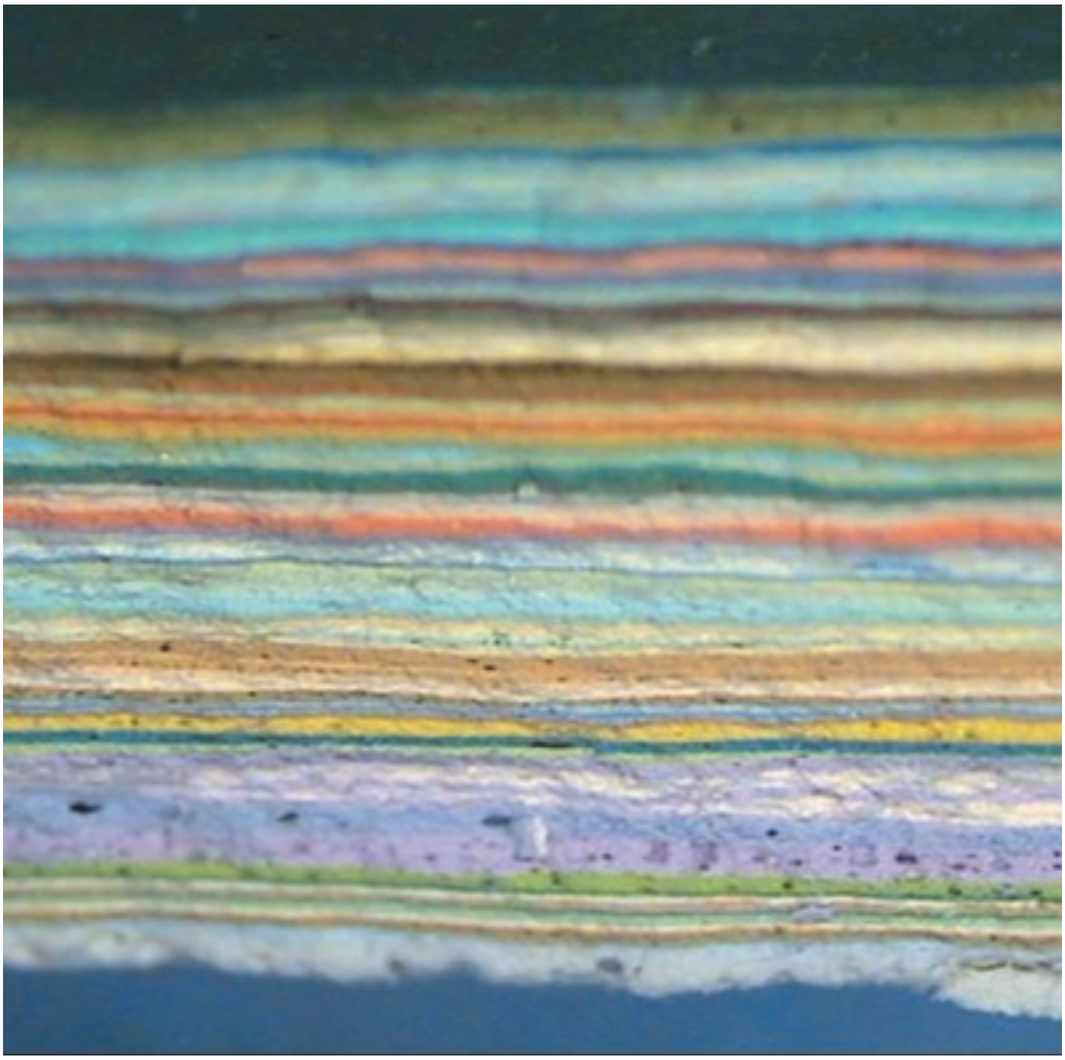
Due to the detectors' increased reliability and durability, the SharpEye 40/40 Series warranty period has been extended to five years and approved by TUV to SIL2. Performance approvals (EN54-10, FM3260, DNV) and Ex approvals (ATEX, IECEx, FM, CSA, GOST-R) are also essential requirements to prove, via third-party testing, that manufacturers' claims are justified.

It is also important to mention the testing of flame detectors. The internal self-test will check the sensors but, necessarily, will not check the outputs. Therefore, the Spectrex range of flame simulators provide an in-situ means to fully end-to-end loop test flame detector, including the wiring connections and control system reaction. The main advantages are that the simulators can be used in Ex hazardous areas and can test the detector from up to nine metres away. This avoids the high cost of scaffolding and other access equipment and encourages testing when it may otherwise have been deemed too difficult.

Summary

Flame detection technologies have come a long way since the first phototube (UV) detected the photons emitted by flames. This has been driven primarily by the ever growing requirements of today's industries that demand high reliability and availability combined with cost effectiveness in their detection equipment for its expensive high-risk facilities and processes. Smaller in size, larger in brains with their miniature microprocessors, modern optical flame detectors provide industry with enhanced flame detection capability and reliability, with much longer detection ranges and minimal or no false alarms. IFP

For more information go to www.spectrex-inc.com



Buying Valuable Time

By David Spicer

Crown Paints

Flame retardant coatings buy valuable time to evacuate a building if fire breaks out.

Evacuating people from a burning building as quickly and efficiently as possible is a serious business and anything that can be done to slow down the spread of flame will, in effect, buy time for the building occupants.

According to independent fire testing establishment, Exova warringtonfire, the approach to flammability testing for internal building lining materials differs around the world. There has been harmonisation in Europe with the introduction of EN 13501-1 and the associated test standards. However, a global supplier is still likely to have to conduct several tests in order to comply with various national regulations.

Crown Paints has focused its testing for the UK, where a new fire scenario was introduced in 2006, whereby all employers owners or managers of buildings (other than single occupancy private dwellings) have a duty of care to achieve and maintain conditions in buildings that reduce the risk of injury, risk to life and damage to property.

The Regulatory Reform (Fire Safety) Order (England and Wales) and the Fire (Scotland) Act require the identification of a "responsible person" – such as an owner, property manager or an employee – who has a duty to ensure that a fire risk assessment of the building as a whole is undertaken. The English/Welsh and Scottish governments have made available a series of advisory guides relating to different industry sectors that provide details of what to look for and how to carry out such a risk assessment. Each of these guides refers to the potential hazards of flame spread over painted walls and ceilings and the need to achieve a Class 0 fire rating in circulation areas and escape routes.

Crown Trade Timonox is a range of flame retardant coatings

Paints – even water-based emulsions – contain resins or binders that may be flammable. Although a single coat of emulsion on a bare plasterboard surface is unlikely to form a hazard, over many years a build up of multiple layers of conventional paint over any surface can become a significant fire risk, particularly in corridors, stairwells and other areas forming part of a fire escape route.

In the UK, wall and ceiling lining materials are classified from Class 0 to Class 4 according to their level of resistance to flame spread and heat release, with Class 0 being the best performing material and Class 4 the worst. In many situations, UK fire regulations demand Class 0 wall and ceiling linings although Class 0 is not a term defined in specific British Standards, but is defined in Appendices to Approved Document B to the Building Regulations or equivalent in Scotland.

A Class 0 performance is generally specified where it is necessary to restrict the use of products that ignite easily and that have a high rate of heat release and could therefore reduce the time to flashover.

It is not possible to test the performance of paint in isolation – a system able to provide a Class 0 rating on plasterboard may give a Class 3 rating when applied to wood – so our fire performance claims cover the paint and substrate in combination. Studies have shown that the Class 0 surface of plasterboard, even when painted for the first time, can be downgraded to Class 2 or worse as subsequent layers of conventional paint are applied.

This is a serious concern for organisations such as local authorities and housing associations, which have a duty of care to minimise fire risk and guard against potential loss of life, injury and property damage. Furthermore, paint build up in communal areas within office blocks, flats, hospitals and old people's homes – in fact most types of buildings – is of particular concern, creating a significant risk of fire spreading throughout a building.

Over many years a build up of multiple layers of conventional paint over any surface can become a significant fire risk, particularly in corridors, stairwells and other areas forming part of a fire escape route.

The following example illustrates the potential consequences of failing to maintain a Class 0 fire protection rating.

An outbreak of fire in an English hospital saw a 50-metre corridor engulfed in flames within three minutes following a bed being set on fire by a patient. On hearing the fire alarm, a nurse located

the fire and evacuated the ward, closing the fire doors before making for the fire exit. However, before the nurse could reach the end of the corridor, an explosion of hot air blew open the fire doors, allowing the fire to spread rapidly down the corridor. Fortunately, in this case, all the occupants of the building escaped without injury, although this incident could easily have resulted in loss of life.

A subsequent investigation into the spread of the fire at the hospital showed that there was a build up of more than 18 layers of paint on the walls, which resulted in the hospital's original Class 0 fire protection rating being reduced to Class 4 spread of flame, despite all the products that had been used having had a Class 0 rating on bare plasterboard.

Commercial flame retardant surface coatings such as Crown Trade Timonox are designed to improve fire performance rating. They are capable of improving a rating from Class 4 to Class 0 and, while they are unable to prevent a fire from starting, as paint is not normally the first thing to be ignited, may provide valuable additional time for a building to be safely evacuated.

with a wall where multiple layers of old paint had been covered with the flame retardant coating.

The test, commonly known as the "Warringtonfire Blue Board Test", features a multi-layer cocktail of ten coats of conventional paint – as might be found on the walls of a building of, say, 30 years of age – applied to a plasterboard substrate which is then tested to BS 476: Part 7. This involves mounting a specimen of specific size of the surface to be tested, at right angles to a high intensity radiant panel. For the first minute of the test a small pilot flame is applied to the surface of the specimen in the hotter region. The test is conducted for a total of ten minutes and the flame spread over the surface is recorded throughout the period.

The test rated this Blue Board surface as Class 4, yet, when it was later treated with the flame retardant paint system, the classification improved to Class 1. A similar panel, subject to BS 476: Part 6 produces heat release indices well in excess of the 6 & 12 required by UK legislation when a Class 0 rating is required. The same Timonox systems then limited the heat release indices below the limits, and hence, combing the two results, met

The spread of the fire at the hospital showed that there was a build up of more than 18 layers of paint on the walls, which resulted in the hospital's original Class 0 fire protection rating being reduced to Class 4 spread of flame, despite all the products that had been used having had a Class 0 rating on bare plasterboard.

During investigation, samples of painted plasterboard walls, identical to those damaged in the fire, were taken from the hospital. When tested, the panels achieved a Class 4 rating. When subsequently over-coated with Timonox Eggshell the result was a much improved Class 1 fire rating.

The importance of using flame retardant coatings is further illustrated in the case of a fire in a tower block, again in England, which caused extensive damage to the flat in which it started. However, in this case, a flame retardant coating had been applied to all communal areas of the tower block as part of the local authority's planned maintenance programme and, although heat in the corridor outside the flat was enough to melt the light fittings, there was no evidence of flame spread beyond the affected apartment.

Generally, flame retardant coatings work by limiting the oxygen around the flames through the release of non-combustible gases, and by using a formulation that provides a barrier to the flammable paint layers beneath. In some cases, an intumescent layer may be used, which produces a foamed insulating carbon char on burning, restricting heat rise in the surface beneath.

Tests carried out by Crown Paints at Exova warringtonfire, showed a marked difference between the spread of flame on a surface intended to demonstrate a worst case scenario of a painted wall or ceiling surface when compared the requirements for a Class 0 rating.

An independent report, produced by Warringtonfire some years ago confirmed that multiple layers of paint in communal areas can represent a significant fire hazard. The report determined that it was not generally necessary to remove previous layers of paint – this was only needed when the original coatings had poor adhesion.

It is recommended that property owners or managers wishing to specify application of flame retardant coatings should call on the services of the paint manufacturer that should first make an assessment of the age and condition of the existing painted surfaces. The specialist may want to take a sample of the existing paint covering away for analysis, as this will show what coating system needs to be applied to offer the optimum protection.

Those using flame retardant coatings need not compromise the aesthetic appearance of their interior decoration. Paint-based systems are often available in a wide range of colours and finishes including matt and silk vinyl and acrylic eggshell, with the option of anti-graffiti protection. A conventional application of two coats of a flame retardant finish over several layers of paint may be sufficient to restore the required Class 0 rating, or a higher performing system can be specified if the existing risk is greater. IFP

David Spicer, Specialist Products Manager at Crown Paints

For more information go to www.crowntrade.co.uk

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The Changing Face Of Fire Safety Design

Niall Rowan

Association for Specialist Fire Protection

The move away from prescriptive regulations and the adoption of fire engineering techniques is not without its challenges, particularly when it comes to passive fire protection.

Traditionally, fire safety design for buildings has been based on compliance with a set of regulations, prescriptive design guides or codes of practice. However, it has become increasingly recognised that these do not always provide owners and developers with the most cost-effective solutions, particularly for innovative developments involving more complex structures, unusual spaces, or new building materials. The safety codes depend on assumptions and over-simplifications, resulting in buildings that are often over-engineered in some areas and misunderstood in others.

Changes have been occurring over the last few years to reflect this. In the UK, Approved Document B was often referred to as "the Building Regulations" as if that was all there was when, in fact, it is only guidance to support and comply with the building regulations – you do not have to follow it. Consequently, the use of fire safety engineering is increasing as trends in buildings change. Architects want iconic buildings and these often do not fit within the framework of conventional codes and regulations, which might require the installation of fire protection measures that do not fit well with the building's design or its function.

The role of fire-designed buildings

Most fire safety practitioners realise the value of and the role that fire safety engineering has to play. I always give the example of building a bridge

across a river. The bridge designer is told the load the bridge has to take, the width of the river, the soil conditions, etc and he or she designs a bridge. The designer is not told, for example, that the bridge must be constructed using brick arches with a maximum ten metre span.

Yet that is exactly what prescriptive legislation for fire safety does. It restricts the designer's freedom and, if our bridge analogy is used, would lead to several identical bridges across a river instead of the wide variety we see today. The freedom to design a bridge using engineering principles allows the designer to choose from many different kinds of bridge. The same argument can be used for fire protection. The fire safety designer can use a range of constructional practices and fire protection techniques to ensure the basics, namely that the building stays up long enough for the occupants to escape and for the fire service to intervene appropriately.

Increase in fire-designed buildings

Consequently, we have seen an increase in the use of a more flexible approach to designing fire safety into buildings. Such an approach is embodied in BS 9999 (Code of practice for fire safety in the design, management and use of buildings). BS 9999 is a kind of "half way house" between Approved Document B and fire safety engineering using BS 7974. It is a prescriptive code of practice for fire safety design beyond the limits of Approved Document B. It is not a fire engineering guide, although it uses fire engineering principles to formulate the guidance provided. It replaces most of the BS 5588 codes of practice for fire safety design of buildings.

BS 9999 provides the designer with guidance on how to design a building taking into account many factors including:

- Risk profiles (building risk category, fire load density, and fire growth potential).
- Designing means of escape (travel distance, occupant number, etc).
- Access and facilities for fire fighting.
- Designing the building structure (load bearing and non load bearing elements, effects of ventilation, fire suppression systems, etc).
- Protection of special risks.
- Managing occupied buildings.

There are concerns that in the rush to take advantages of the freedom that fire-designed buildings give us, we are not taking into account the problems of existing buildings and how those problems, if transferred to the fire-designed buildings, may lead to an unacceptable risk.

But, on the other hand, there are concerns that in the rush to take advantages of all the freedoms that fire-designed buildings give us, we are not taking into account the problems of existing buildings and how those problems, if transferred – as they will be – to the fire-designed buildings, may lead to an unacceptable risk. Existing buildings may be over engineered, but they have pitfalls and problems that compensate for this.

Problems with existing buildings include:

- Badly specified fire protection (wrong type and or number of products, use of products where performance has not been adequately verified by test, assessment or preferably third-party product certification).
- Improperly installed fire protection (missing or wrongly installed products and systems, use of unskilled labour, installations not checked by Building Control, etc).

- Actions taken by occupants to disable or render ineffective any fire protection measures (fire alarms switched off, fire doors wedged open, vandalism and subsequent installation of services through compartment walls or floors without reinstating the fire resisting construction).

So some existing buildings might be over engineered, but the robustness of the regulations copes, or counteracts, many of the problems listed above. What we are doing now is removing the over engineering (or the robustness, if you like) and not replacing it with anything. So the fire engineered building may well be a problem if much of the reduced fire protection that was specified is not functioning, or is not installed properly, or has been vandalised.

Is there evidence to support such fears? In the absence of a significant number of fires in fire-designed buildings, because they are still relatively new and there are not enough of them, there cannot be much evidence. However, recent events have shown us the tragic effects of reduced fire protection in traditional buildings. To have a reduction of designed-in fire protection must give rise for concern unless mitigating actions are put in place.

Best practice guide

The publication of the Association for Specialist Fire Protection (ASFP) best practice document was preceded by a detailed three-year government-funded project, where independent research on fire safety provisions was collected on a wide variety of buildings. The research repeatedly showed that the misplaced reliability on fire compartment walls and barriers is a real problem. In some complex buildings, detailed drawings were missing and occupants had no knowledge of the location of essential defences, such as compartment walls. A high percentage of compartment walls were either defective through poorly installed fire stopping of penetrating service systems, or invalidated by incompetent maintenance.

Lakanal House

Last year, the UK government's chief fire and rescue adviser, Sir Ken Knight, published his initial report on the emerging issues arising from the fatal fire at Lakanal House, Camberwell in London. The report reminds us of the fundamental principles intended for the construction of larger buildings stating: "There is a long established principle that the design and construction of high-rise buildings enable the occupants adjacent to the immediate fire area to make their way to a place of safety, while other occupants can remain safely in their homes. These principles do require that a satisfactory level of passive and active fire safety systems are installed and maintained." It went on to state: "The protection incorporated into the design and fabric of the building is the fundamental basis for reducing the spread of fire and loss of life…." "In undertaking major changes and refurbishment work in such buildings, the significance of the passive fire protection is required to be clearly specified and understood by the main contractor for the work, as well as those installing or altering the protection."

So it is quite clear that designers are responsible for making safe designs of buildings and those buildings must be maintained properly – including the installation or refurbishment of active and passive fire protection measures – by suitably competent people who recognise the significance of the work they are doing. However, the best practice guide research has shown us that this is simply not occurring, and the response of architects, building designers and some fire safety consultants is to further water down fire safety measures.

Am I missing something here? How about doing what is supposed to be done properly first, then engineer out the fire protection in the knowledge that it will be properly installed, inspected and maintained?

Regulatory reform (fire safety) order 2005

There is a clear duty under the UK's Regulatory Reform (Fire Safety) Order 2005 that a fire risk

assessment must be made by a "responsible person", normally the building owner, landlord or person operating the business on the premises.

Investigations made by the BBC in the wake of the Lakanal House fire, however, revealed that hundreds of tower blocks had not been assessed for fire safety and that the local authority, which seemed to be the worst offender, had only carried out risk assessments on two of its 112 tower blocks. The situation is much better now, but only because of the adverse publicity surrounding the fire.

Subsequently, the fire risk assessment at Lakanal House was acknowledged to be deficient. Perhaps this is because there are no qualifications or requirements to be a fire risk assessor. We know from fire risk assessments that are carried out that many of the assessors (referred to in the Fire Safety Order as the "competent persons") are not sufficiently knowledgeable on passive fire protection measures. The ASFP is in the process of drafting guidance for fire risk assessors to ensure that they thoroughly, but realistically, evaluate the passive fire protection measures when undertaking fire risk assessments.

What needs to be done?

Fire-designed buildings, whether fully engineered using BS 7974 or BS 9999, are not going to go away and it is not for the ASFP to advocate that position. The benefits of fire-designed buildings are recognised for what they are. However, the increasing use of such building design techniques, which will lead to a reduction of designed-in passive fire protection, is of concern unless suitable mitigating or compensatory measures are taken.

These should include:

- The mandatory use of third-party certificated products installed by third-party certificated installers, or . . .
- The mandatory inspection of all installed passive fire protection.
- No introduction of a so called "competent persons" schemes for installers of passive fire protection, unless such schemes are either personnel certification schemes with individuals certificated against EN 17024 or company schemes certificated against EN 45011. In either case, any schemes should be accredited by UKAS.
- A register of fire risk assessors that includes evaluation of their competence in the area of installed passive fire protection.
- Fire risk assessors to be members of either personnel certification schemes with individuals certificated against EN 17024, or company schemes certificated against EN 45011. In either case, any schemes should be accredited by UKAS

The number of fire-designed buildings is increasing across the world, but those taking over such buildings often have very little knowledge in this area. It is imperative that if we are to increasingly use engineering techniques to provide fire safety, we must have total confidence that the passive fire protection measures specified are installed and maintained correctly. Changing approaches to fire safety design should not mean lowering fire safety. IFP

Niall Rowan is Technical Officer at the Association for Specialist Fire Protection.

For more information go to www.asfp.org.uk

Deaf To The Warni

By Wesley Kent

Fireco Ltd.

Imagine being caught up in a fire, yet being completely unaware that an alarm has been raised. For the deaf or hearing challenged it is risk they face every time they enter a public building.

Try putting yourself in the shoes of a profoundly deaf young woman whose ordeal while out shopping was recently reported in the news media. "I was in the changing room of a clothes store," she explains. "After 15 minutes I came out and found the whole shop completely deserted. I put down the clothes and walked out, to be met by embarrassed shop assistants explaining the fire alarm had gone off and they had assumed everyone had heard it because they had not realised I was deaf."

This frightening experience highlights the vulnerability of the deaf, particularly in public places, who everyday live with the threat of a fire alarm sounding an emergency warning they cannot hear.

Deaf demographics

Deafness is often regarded as a "hidden disability" because it is frequently not immediately obvious that someone is deaf. This false assumption can lead to an acceptance by management that a deaf person is somehow capable of coping unaided – a dangerous misconception when you consider that worldwide deaf demographics show the problem of hearing loss is growing at a surprising rate.

It is estimated that the number of hearing-impaired people in the developed world alone will reach 215 million by 2015. Of these, some 90 million will be Europeans, where about 71 million adults aged between 18 and 80 years have a hearing loss greater than 25 dB (the definition of hearing impairment). Reportedly, one in six adult Europeans suffers from hearing loss great enough to adversely affect their daily life.

In North America, more than 25 million people are estimated to be hearing impaired, while in the UK, the number of people with severe hearing loss is predicted to rise to a million within the next twenty years. Worldwide, more than 900 million people will suffer from hearing loss of more than 25 dB by 2025.

With such growing numbers of sufferers, then, more and more people are destined to be isolated from the hearing population and, in consequence, threatened by shortcomings in fire safety precautions designed for the "audible world".

Potential deaf trap

Recent behavioural studies of fire evacuations demonstrate just how especially vulnerable deaf people are in fire evacuations from public buildings, revealing that two-thirds of the public occasionally or never think about evacuation procedures from buildings they regularly occupy; a figure that rises to 89 percent in buildings they use infrequently.

ngs

Even more worrying, in the event of a fire alarm sounding, 40 percent of the public would instinctively follow people in their vicinity – even into danger. And only 29 percent would use the nearest exit. Clearly, these behavioural responses represent a herd mentality and have serious implications for deaf and hard of hearing people.

As the deaf young woman says, when recalling her own experience of fire safety failures: 'If a fire alarm goes off in a big supermarket how is the deaf person supposed to know? True, if the store is busy, then obviously everyone else running for the exit would prompt them. But, if it is quiet, they might not be aware until it is too late."

Even visual alarms can go unnoticed. "Ironically, it is easy for a deaf person to have blind spot. A deaf person has to have eyes in the back of their head to compensate for their ears not functioning as they should. A profoundly deaf person's neck hurts from constantly looking around to make sure they are out of harm's way."

There are however new products becoming available that use text messaging (SMS) to automatically inform a deaf person when the fire alarm sounds in a public place such as a supermarket or shopping centre, giving deaf and hard of hearing people the freedom to move around buildings

Worldwide, more than 900 million people will suffer from hearing loss of more than 25 dB by 2025.

without the worry of missing an emergency situation. Significantly, these are obligations to deaf building occupants that are enshrined in national policies and legislation to prevent disability discrimination. These require compliance, such as the provision of auxiliary aids or services to improve communication for people with sensory impairments, including those affecting hearing.

A quiet revolution

The dramatic growth of mobile phone technology has profoundly changed the lives of millions of deaf people. For the first time, a generation of deaf people can communicate with the world on the same terms as the hearing population, using mobile phones, of which there are now some five billion worldwide.

For this new generation of deaf people, mobile texting has provided a lifeline that helps bridge the gap between the hearing-impaired communities and the hearing world. "I do not have to depend on hearing people," is a typical comment by a deaf user. "It makes me so much more independent. And text messaging is less work. I can communicate any time I want to. Texting is very fast and very efficient."

Take note of the deaf consumer

In response to these trends, international supermarket chains are recognising that one in every six people is a lot of spending power that their businesses should not ignore. By removing communication barriers, forward-looking companies are aware that the secret to better bottom-line performance is to empower consumers and make the purchase of products a trouble-free experience, and this empowerment should embrace their deaf customers. Business strategists also know that consumers respond positively to the added value of services that cater to special needs.

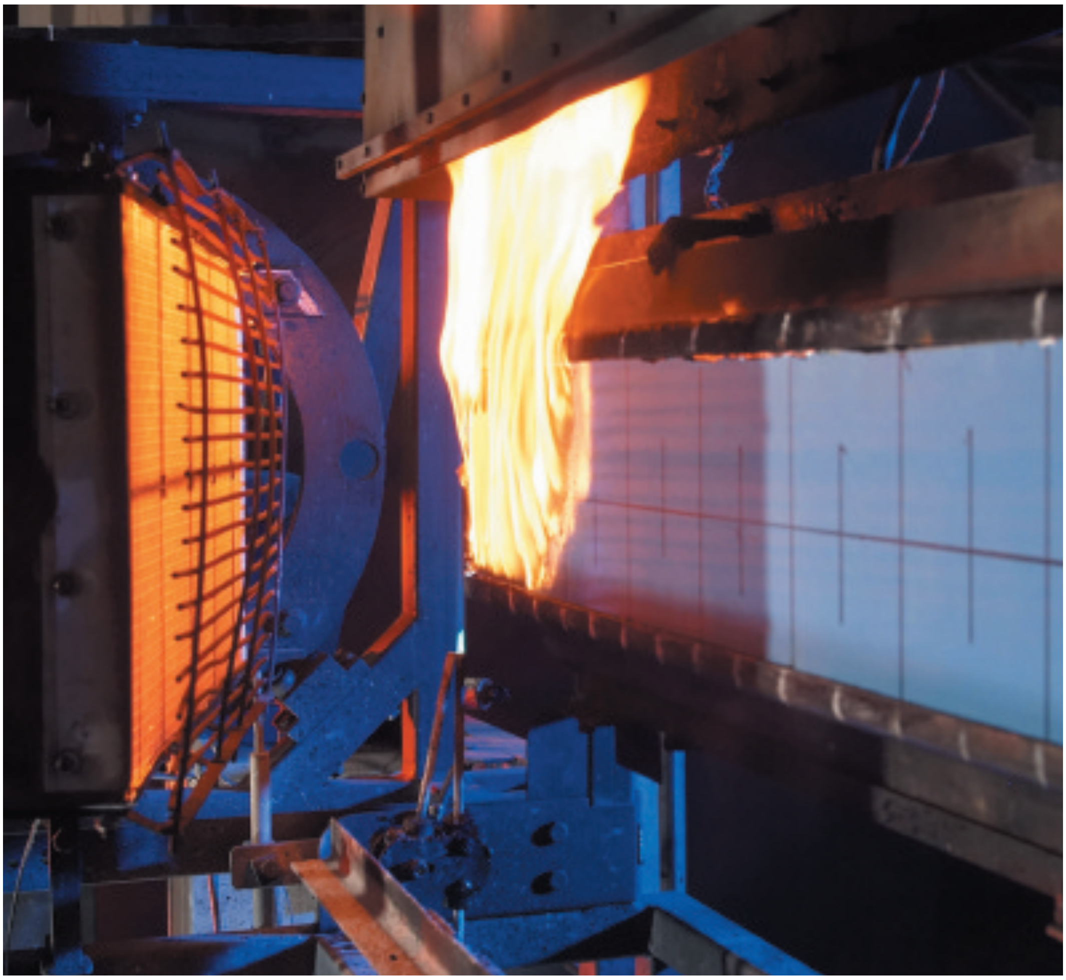
As one deaf consumer confirms: "Deaf people are active members of society, with jobs, families and disposable incomes to spend. So it is only right that businesses should provide for all their special needs, particularly by ensuring that they are safe and secure against fire while on their premises. Deaf messaging technology is obviously attractive because texting is the medium the deaf community uses all the time."

This readily available technology has now been harnessed by Fireco, a designer and manufacturer of Deaf Message Service (DMS), a new product that uses text messaging to automatically inform a deaf person when the fire alarm sounds in a public place. It puts the deaf and hard of hearing on the same level of those without the disability and provides them with the freedom to move around buildings without the worry of falling prey to what to them is a silent enemy – fire. IFP

Wesley Kent is Sales Director Fireco Ltd.

For more information go to www.deafmessageservice.com

Non-approved product



The increasing volume of non-approved, low quality products being imported into some markets only highlights the benefits to be gained from third-party testing and certification by independent accredited bodies.

By Leigh Hill

Warrington Certification, part of the Exova group

The issue at the core of this growing dilemma is quite simple. How can we say with conviction that any product – whether mechanical, electrical or other – will do what it says it will do, and is fit for purpose? The proliferation of non-approved, low quality products being imported into some countries places a further responsibility on the supply chain, whether you are a specifier, distributor or installer. How can you be sure that a product assures performance?

The questions around the quality and safety of passive fire protection products and systems comes at a time of increasing pressure on manufacturers and the whole supply chain in terms of legislation and compliance.

For manufacturers looking for market differential, the real value of product certification is that it is issued by an accredited third party. This means there is genuine independent endorsement, and that experts have tested and verified that the particular product in question performs to the quality and safety levels required or beyond. In the event of a failure, the fact that you can demonstrate that you have made all reasonable efforts to ensure the quality of a certificated product or system – and that there is a certificate that says so – will help to mitigate any accusation of possible negligence.

Even CE marking is no guarantee of performance or origin, but is merely a declaration by the manufacturer that this product meets the minimum requirements of the applicable European Directive. Credible third-party schemes have to go far beyond the requirements of CE marking, typically involving in-depth inspection and surveillance regimes to monitor the manufacturer's quality management system and factory production control systems. They will also cover initial type-testing on independently sampled production, design appraisal against a technical schedule, assessment of a defined application and ongoing audit testing.

The product must be fit-for-purpose and, in addition to the fire performance and quality aspects, the third-party also assesses all other relevant essential performance characteristics, for example, durability, thermal and acoustic performance.

s – why take the risk?

If everyone involved in a project takes responsibility for their duty-of-care, there will be no compromise on specifying and installing third-party certificated products and systems from the start. Ideally, this should start with the architect or designer, who can build-in the requirement for certified products into the specification. For many manufacturers, whether it is fire doors, firestopping systems or cabling, the testing of a product or system should be important for safety reasons to make sure it meets the relevant British Standard (BS) or European standard (EN). The further rigorous inspection of the manufacturer's processes and systems that lead to certification provides transparent evidence of a product's quality.

The contractor is responsible for a professional installation using the specified products for the project. He should be checking that the specified products are delivered to site by the distributor and fully installed in accordance with the manufacturer's instructions. For the end user, it is also recommended to check that what has been specified by the architect has been installed by the contractor.

The real value of product certification is that it is issued by an accredited third party. This means there is genuine independent endorsement, and that experts have tested and verified that the particular product in question performs to the quality and safety levels required.

Indeed, there is no legal obligation on manufacturers to test to levels of certification, but the benefits – especially with the increasing volumes of non-approved products on the market and subsequent legal action – speak for themselves. If something goes wrong with a fire performance system there is usually life and property at stake. In the UK, this can result in legal action against the architect, specifier, main contractor or building owner as the "responsible person" under the Regulatory Reform (Fire Safety) Order 2005.

According to figures from Britain's Department for Communities and Local Government (DCLG), there were 61,000 building fires in England during the 12 months from March 2009 to April 2010,

including 22,000 fires in commercial premises. Of the 328 deaths from fires, a third occurred in commercial buildings. The cost of these fires to business runs into millions of pounds and cannot be accurately counted, as many insurance claims and legal proceedings are still running.

In England, Wales and Northern Ireland, the Fire Safety Order applies to you if you are responsible for business premises, an employer or self-employed with business premises, responsible for a part of a dwelling where that part is solely used for business purposes, a charity or voluntary organisation, a contractor with a degree of control over any premises or providing accommodation for paying guests. Under the legislation, the responsible person must maintain a current fire safety risk assessment and implement and maintain a fire management plan.

This should consider some key issues including identifying fire hazards, considering the people who may be at risk, evaluating and reducing any risks, recording what is in the plan and reviewing your risk assessment to ensure it remains up to date and reflects any changes that may have occurred. If there is any doubt about fire risk assessment or third-party certification, advice should be sought from recognised certification bodies.

So, why take the risk?

With the expert rigour and testing associated with a third-party certification scheme the architect – and the others in the supply chain – can say truly that they have specified a product that is fit-for-purpose when installed correctly. They can also have peace of mind that they have fulfilled their own duty of care. IFP

Leigh Hill is business development manager at Warrington Certification, part of the Exova group providing laboratory testing, advising and assuring services to companies worldwide

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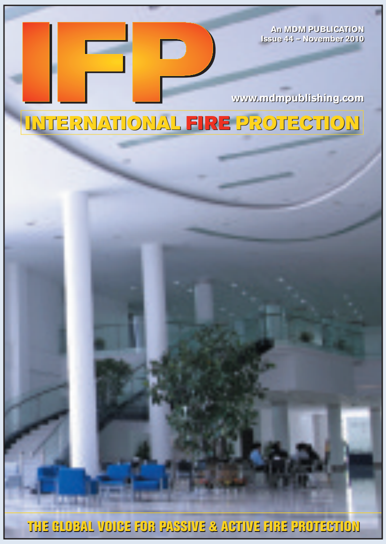

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